

**Environmental Assessment:
Peterson AFB
Military Housing Privatization Initiative
El Paso County, Colorado**



Prepared for:

U.S. Air Force Center for Environmental Excellence

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Cover Sheet:
Final Environmental Assessment
Military Housing Privatization Initiative
Peterson Air Force Base, Colorado

- A. *Responsible Agency*: Department of the Air Force, Peterson Air Force Base (AFB), Colorado (CO).
- B. *Cooperating Agencies*: None.
- C. *Proposals and Actions*: This environmental assessment (EA) has been prepared in accordance with the *National Environmental Policy Act* to analyze the potential environmental consequences of the proposed Military Housing Privatization Initiative (MHPI) at Peterson AFB, CO. Peterson AFB is located in El Paso County, CO, approximately seven miles east of Colorado Springs, CO. No public comments were received on the Draft EA during a 30-day availability period ending June 5, 2006. The attached Finding of No Significant Impact documents the U.S. Air Force's decision to implement the proposed action.
- D. *Comments and Inquiries*: Comments or inquiries regarding this document should be directed to Ms. Heidi Mowery, 21 CES/CEVQ, 580 Goodfellow Street, Peterson AFB, CO 80914-2370, (719) 556-1459.
- E. *Designation*: Final Environmental Assessment and Finding of No Significant Impact
- F. *Abstract*: This EA evaluates the potential for environmental consequences from the proposed action, one alternative action, and the no action alternative for implementing the MHPI at Peterson AFB. Peterson AFB currently has 493 housing units, and has a requirement for military housing for 723 families. The proposed action is for the Air Force to convey the 493 existing housing units and certain associated improvements, and sublease approximately 217 acres of land divided among six parcels, to a private real estate development and property management company. The Air Force proposes that the developer would demolish 153 existing units, renovate 251 units, and construct 383 new units; no renovation is required for 89 existing units. The developer would own all housing units and related infrastructure, would sublease the land from Peterson AFB, and would maintain and manage the housing area for a minimum of 723 military families for 50 years. Under the no action alternative, the Air Force would not implement the MHPI at Peterson AFB and would continue to maintain and manage military housing in accordance with Air Force policy. Under the third alternative, the Air Force has given prospective developers the option of proposing an off-base location for developing privatized housing for Peterson AFB under the MHPI; no specific location(s) have been identified at this time. Resources and issues addressed in the EA include air quality; soils, geology, and topography; water resources; biological resources; human health and safety; solid waste and hazardous materials; noise; cultural resources; land use; traffic and transportation; and socioeconomics and environmental justice.

Finding of No Significant Impact Military Housing Privatization Initiative Peterson Air Force Base, Colorado

INTRODUCTION

The United States Air Force proposes to implement a Military Housing Privatization Initiative (MHPI) at Peterson Air Force Base (AFB). Peterson AFB currently has 493 housing units, and has a requirement for military housing for 723 families. Pursuant to Section 102(2)(c) of the *National Environmental Policy Act* (NEPA) of 1969, the Council on Environmental Quality (CEQ) regulations (40 CFR Sec 1500-1508) implementing procedural provisions of NEPA, and Air Force regulations for the Environmental Impact Analysis Process (32 CFR 989), the Department of Defense (DoD) gives notice that an environmental assessment (EA) has been prepared for the proposed housing privatization initiative at Peterson AFB, attached and incorporated by reference. This document serves as a Finding of No Significant Impact (FONSI).

THE PROPOSED ACTION AND ALTERNATIVE ACTIONS

The following paragraphs describe the proposed action, the no action alternative, and one alternative action.

Proposed Action

The proposed action is for Peterson AFB to convey 493 housing units and certain associated improvements, and sublease approximately 217 acres of land divided among six parcels, to a private real estate development and property management company. The Air Force proposes that the developer would demolish 153 existing units, renovate 251 units, and construct 383 new units; no renovation is required for 89 existing units. The developer would own all housing units and related infrastructure, would sublease the land from Peterson AFB, and would maintain and manage the housing area for a minimum of 723 military families for 50 years.

No Action Alternative

Under the no action alternative, the Air Force would not implement the MHPI at Peterson AFB and would continue to manage and maintain military housing in accordance with existing Air Force policy. The Air Force would likely demolish, renovate, and construct houses to eventually reach the same end state as under the proposed action to reach the minimum requirement of 723 units.

Off-Base Privatized Housing

The Air Force has given prospective developers the option of proposing an off-base location for developing privatized housing for Peterson AFB under the MHPI. No specific location(s) have been identified at this time.

ENVIRONMENTAL EFFECTS

The environmental effects of the proposed action, no action alternative, and off-base privatized housing alternative are summarized below.

Summary of Environmental Impact Analysis Results

Resource	Summary of Impact Analysis Results		
	Proposed Action	No Action	Off-Base Privatized Housing
Air Quality	Temporary increase in criteria pollutants from construction. Fugitive dust permits may be required during construction. Slight increase in long-term emissions from unpermitted sources (residential furnaces). No significant impacts.	No impacts.	Impacts are expected to be similar to those of the proposed action (depending on a specific location, which has not been identified); not significant.
Soils, Geology, and Topography	Temporary soil disturbance, in accordance with permit requirements. Beneficial impact on soil quality from remediation in Parcels E-3 and E-5. No significant impacts.	No impacts.	Impacts are expected to be similar to those of the proposed action (depending on a specific location, which has not been identified), except for beneficial impact from remediation of Parcel E-5. No significant impacts.
Water Resources	Surface water impacts from temporary soil disturbance would be limited by best management practices. No significant impacts.	No impacts.	Impacts are expected to be similar to those of the proposed action (depending on a specific location, which has not been identified); not significant.
Biological Resources	No significant impacts.	No impacts.	Data gap for potential impacts to vegetation and wildlife, including protected species (a specific location would be required for analysis of this endpoint).

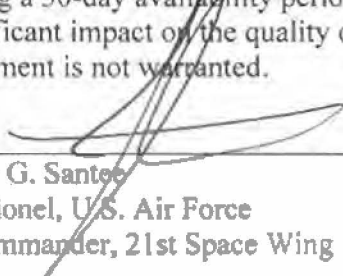
Resource	Summary of Impact Analysis Results		
	Proposed Action	No Action	Off-Base Privatized Housing
Human Health and Safety	Human health and safety risks associated with area traffic and residential pesticide application would increase; however, these risks would be similar to those posed at current housing locations. Human health and safety risks posed by construction activities can be mitigated and would be short-term. Long-term beneficial impact due to removal of hazardous materials of construction (asbestos and lead-based paint) in current housing. Risk-based remediation of lead and PAH contamination on current sket range will mitigate potential for risks to future residents on Parcel E-3. No significant impacts.	Contaminated soils in Parcels E-3 and E-5 may not be remediated. Decreased potential for and/or longer period of time to realize long-term beneficial impact due to removal of hazardous substances of construction (asbestos and lead-based paint) in current housing.	Impacts are expected to be similar to those of the proposed action; not significant. Contaminated soil in Parcel E-3 may not be remediated as quickly. Residences containing hazardous materials of construction may not be renovated as quickly.
Solid Waste and Hazardous Materials	Short-term increase in solid and hazardous waste generation during construction and Parcel E-3/E-5 remediation, followed by localized long-term increase in municipal solid waste generation during residential occupation. Widespread removal of hazardous materials of construction from existing residences. No significant adverse impacts.	No impacts.	Impacts are expected to be similar to those of the proposed action; not significant.
Noise	Intermittent short-term impacts during construction. Long-term increase in area noise from increased area traffic and residential sources. No significant adverse impacts.	No impacts.	Impacts are expected to be similar to those of the proposed action (depending on a specific location, which has not been identified); not significant.
Cultural Resources	No significant impacts.	No impacts.	Data gap for potential impacts to cultural resources (a specific location would be required for analysis of this endpoint).

Resource	Summary of Impact Analysis Results		
	Proposed Action	No Action	Off-Base Privatized Housing
Land Use	No significant impacts.	No impacts.	Change from undeveloped land to subdivision with up to 723 houses; no significant adverse impact anticipated, but zoning change may be required, depending on specific location.
Traffic and Transportation	Short-term increase from construction-related traffic. Long-term increase in local community traffic offset by decreased commuter traffic from other areas. No significant impacts.	No impacts.	Impacts are expected to be similar to those of the proposed action; not significant.
Socioeconomics and Environmental Justice	Short-term beneficial impact on employment and income during construction. Public schools have adequate capacity to accommodate increased base residential population. No significant adverse impacts.	No impacts.	Impacts are expected to be similar to those of the proposed action; not significant.

There would be no significant cumulative impacts.

Finding of No Significant Impact

Based on the attached EA, conducted in accordance with the CEQ and Air Force regulations implementing NEPA, an assessment of the identified environmental effects has been prepared for the proposed MHPI at Peterson AFB. No public comments were received on the Draft EA during a 30-day availability period ending June 5, 2006. I find that the action will have no significant impact on the quality of the human environment; thus, an Environmental Impact Statement is not warranted.


 Jay G. Santee
 Colonel, U.S. Air Force
 Commander, 21st Space Wing

2 APR 06
 Date

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- B – Air Emissions Estimates for the Proposed Action
- C – Skeet Range Soil Sampling Results

ENVIRONMENTAL ASSESSMENT: MILITARY HOUSING PRIVATIZATION INITIATIVE AT PETERSON AIR FORCE BASE

SECTION 1. PURPOSE AND NEED

1.1 Introduction

The quality of government-owned housing has declined for more than 30 years primarily due to lack of priority. The Department of Defense (DoD) estimates that about 200,000 military housing units are old, lack modern amenities, and require renovation or replacement. According to DoD, completing this work at current funding levels and using traditional military construction methods would take 30 years and cost about \$16 billion (Yim 1999). To improve housing more economically and faster than could be achieved if only traditional military construction funds were used, the Congress enacted legislation at DoD's request authorizing a five-year pilot program, termed the Military Housing Privatization Initiative (MHPI), to allow private sector financing, ownership, operation, and maintenance of military housing. Under the program, which was initially authorized in 1996 under the *National Defense Authorization Act* and was reauthorized in 2001 for an additional five years, DoD can provide direct loans, loan guarantees, and other incentives to encourage private developers to construct and operate housing either on or off military installations. The program takes advantage of the private sector's investment capital and housing construction expertise to provide better quality housing to its service members. DoD believes that the authorities the MHPI provides will contribute significantly to its plan to solve its housing situation by 2010, when combined with traditional funded government construction (Yim 1999).

Peterson Air Force Base (AFB) is located on the site of the former Colorado Springs Army Air Base, established during World War II through a lease with the City of Colorado Springs on the site of the Colorado Springs Municipal Airport. It was renamed Peterson Army Air Base (Peterson Field) in 1942. In 1945, the Government destroyed the base surplus facilities and returned the land to the city. In 1948, the Government negotiated for the city to provide flying facilities at the airport, and then, in 1949, put Peterson Field on inactive status. In 1951, the field was reactivated, and, in 1976, was renamed Peterson AFB. In 1982, Peterson became home to the new Air Force Space Command, and has been under command of the 21st Space Wing since 1992. Other permanently assigned units at Peterson AFB include the North American Aerospace Defense Command and several major tenant units. The base has a working population of 5,700 to 8,000 individuals.

Peterson AFB proposes to conduct a real estate transaction authorized by the MHPI to convey 493 existing housing units and certain associated improvements, and sublease approximately 217 acres of land divided among six parcels of improved and unimproved land, to a private developer ("Project Owner"). The Project Owner will obtain necessary financing; provide required equity; and plan, design, develop, renovate, demolish, construct, own, operate, maintain, and manage a rental housing development, including all paving and drainage, as well as any utilities conveyed to or constructed by the Project Owner, for a minimum of 723 military families for 50 years on four of the parcels. The other two parcels will be subleased for a maximum transition period of six years for specific demolition/relocation activities but will not be locations for family housing.

The Project Owner will be the successful bidder in response to a Request for Proposals (RFP) for this activity, and has not yet been identified.

Housing privatization is considered a major Federal action subject to the requirements of the *National Environmental Policy Act* (NEPA) of 1969, as amended, which requires Federal agencies to consider environmental impacts in their decision-making process. This environmental assessment (EA) evaluates the potential for environmental consequences of real property transactions associated with the privatization of housing at Peterson AFB, in accordance with the President's Council on Environmental Quality (CEQ) regulations for implementing NEPA (Title 40 Code of Federal Regulations (CFR) 1500-1508) and Air Force regulations for the Environmental Impact Analysis Process (32 CFR 989). These Federal regulations establish both the administrative process and substantive scope of the environmental impact evaluation, designed to ensure deciding authorities have a proper understanding of the potential environmental consequences of a contemplated course of action. A notice of availability was published in *The Gazette* (Colorado Springs) on May 5 through May 7, 2006, announcing the availability of the Draft EA for a 30-day review period ending June 5, 2006; no public comments were received.

This EA presents the purpose and need for the action (Section 1), describes the proposed action and alternatives (Section 2), identifies the characteristics of the affected environment (Section 3), and summarizes the analysis of the potential for environmental consequences (Section 4). Agencies contacted (Section 5), the list of preparers (Section 6), and references (Section 7) are also included. Appendix A presents terms, acronyms and abbreviations used; Appendix B presents air emissions estimates from the proposed action; and Appendix C presents soil sampling results from the skeet range (Parcels E-3 and E-5).

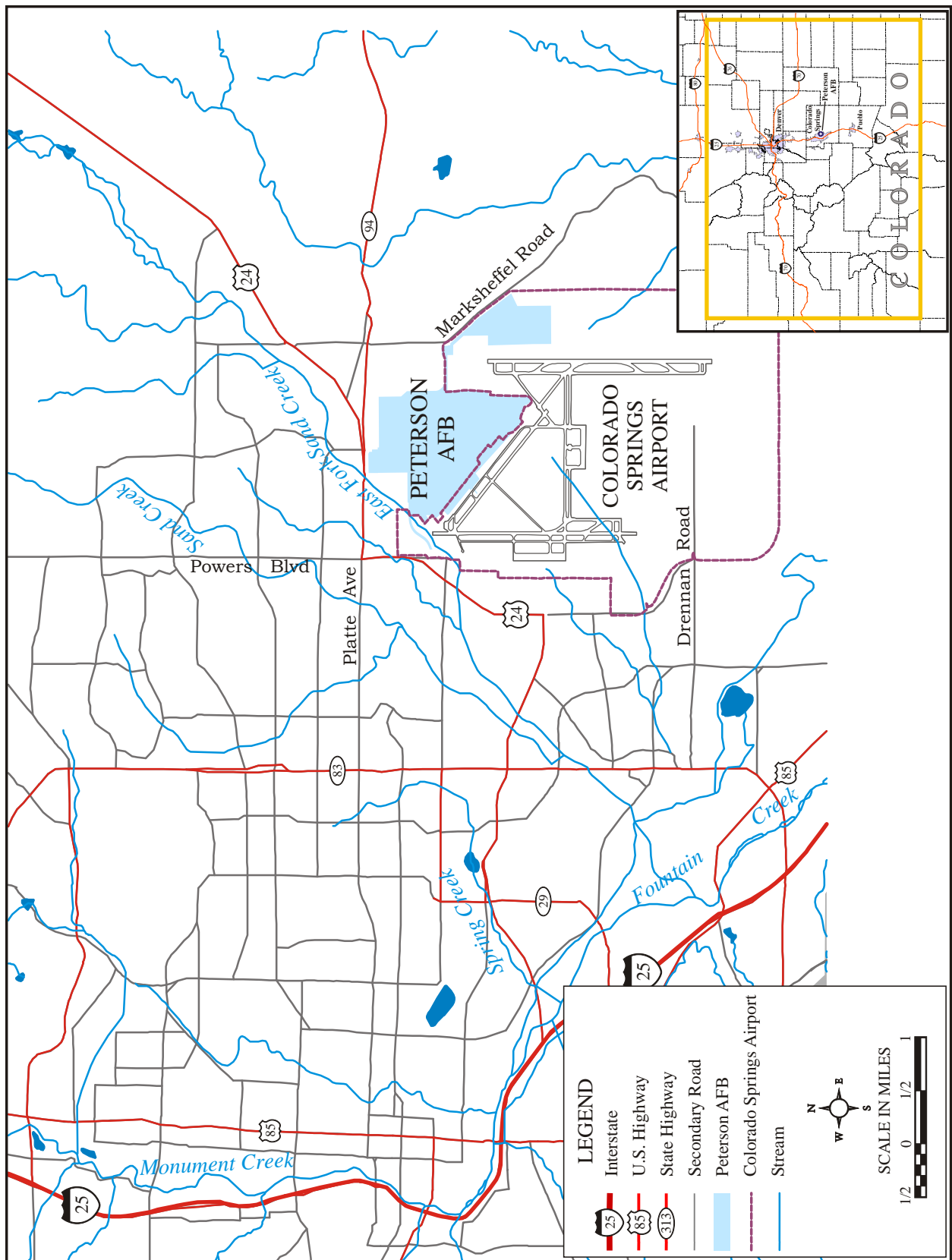
1.2 Project Location

Peterson AFB is situated along the Rocky Mountain Front Range about seven miles east of downtown Colorado Springs, CO, in El Paso County (Figure 1). The base is adjacent to the Colorado Springs Municipal Airport, and is accessible by U.S. Highway 24 and Colorado State Highway 94, which border the northern portion of Peterson AFB. The Colorado Springs Municipal Airport borders the facility on the west and south. Peterson AFB consists of 1,278 acres, of which 1,094 acres are leased from the city of Colorado Springs. A separately acquired area known as Peterson East consists of approximately 256 acres. The runways at Peterson AFB are owned by the city of Colorado Springs and used by both civilian and military aircraft. The Federal Aviation Administration controls the airfields. There are over 410 buildings on the base. Most of these are concentrated on the main base, which has been extensively developed and redeveloped through the years.

1.3 Purpose of and Need for Action

Air Force policy establishes a minimum family housing requirement for each installation, based on the following four criteria:

- The need for a military community,



- Housing for personnel in key and essential positions,
- Preservation of historic housing, and
- Housing for the personnel whose level of regular military compensation is below 50% of the median family income in the local area.

In the 2005 Housing Requirements and Market Analysis (HRMA) report for Peterson AFB, it was concluded that there will be a requirement by 2010 for housing for 723 families at Peterson AFB, including 657 Peterson AFB families and 66 Cheyenne Mountain Air Station families (USAF 2005a). A portion of this requirement (along with a portion of the requirements of Schriever AFB and Cheyenne Mountain Air Force Station) has been met in the past using available U.S. Air Force Academy (USAFA) assets. However, as USAFA is planning a housing privatization initiative to reduce its surplus housing, no new personnel from Peterson or Schriever AFBs or Cheyenne Mountain Air Station are allowed to move in to the USAFA housing. Schriever AFB is planning to develop its own housing under a similar privatization initiative, to directly meet the needs of its service personnel.

Peterson AFB has identified a need to improve the quality of the military housing available to its service members. Of the 493 existing housing units, only 181 (less than 37%) have been rated as meeting or exceeding Air Force standards. With the exception of two units constructed in 2003 and 7 constructed in 1996, the units are all over 25 years old, with 1 constructed in 1980, and the rest constructed in 1975, 1969, and 1965. Except for 72 multifamily units and 15 single-family units, all units were renovated within the last 15 years.

Under the MHPI, Peterson AFB is permitted to enter into a variety of arrangements with private sector entities to build and renovate military housing both on and off military bases. DoD believes that the authorities the MHPI provides will contribute significantly to its plan to solve its housing situation by 2010, when combined with traditional funded government construction.

SECTION 2. ALTERNATIVES INCLUDING THE PROPOSED ACTION

This section presents the proposed action, the no action alternative, and an off-base privatized housing alternative, and briefly describes alternatives that were identified but will not be considered in detail in the EA.

2.1 Alternative 1 – Proposed Action

The MHPI allows Peterson AFB to address housing needs through conveyance of improvements and leasing of specialized land parcels to a private developer for the purpose of privately financing the construction and management of military housing areas.

The proposed action involves a non-Federal Acquisition Regulation real estate transaction with the Project Owner under which the Government will convey 493 existing housing units and certain associated improvements, and sublease approximately 217 acres of land divided among six parcels (E-1 through E-5 and E-1-A, see Figure 2), as follows:

Housing Area	Existing Units	Approximate Acres
Parcel E-1, existing housing area	486	118
Parcel E-2, former mobile home area	0	13
Parcel E-3, driving range, skeet range, 302nd Airlift Wing storage area, and contractor staging area	0	52
Parcel E-4, undeveloped land	0	16
Parcel E-5, skeet range	0	17
Parcel E-1-A, existing housing area	7	1
Total Housing Conveyed	493	217

The Project Owner will be the successful bidder in response to an RFP for this activity, and has not yet been identified. The remainder of this subsection summarizes the detailed design, construction, and environmental requirements from the most recent version of the Draft RFP (January 13, 2006). Dates regarding the transaction's milestones are subject to change. However, at the time of this EA, the expected timeline for the proposed project consists of release of the solicitation / RFP in Summer 2006, proposals due in Fall 2006, identification of the highest ranked offeror in Winter 2006-2007, and closing the transaction in Spring 2007. All construction will be completed within six years of closing the transaction.

The Project Owner would obtain necessary financing; provide required equity; and plan, design, develop, renovate, demolish, construct, own, operate, maintain, and manage a rental housing development, including all paving and drainage, as well as any utilities conveyed to or constructed by the Project Owner, for a minimum of 723 military families for 50 years on Parcels E-1 through E-4. The 723 units are referred to as "privatized units," and are reflected in the follow major project components:





Figure 2. Location of Proposed Housing Areas

Action	Number of Units
Convey	493
Demolition	153
New Construction	383
Renovation	251
No Renovation Required	89
Total End-State	723

General descriptions and proposed disposition of the units in each parcel are as follows:

- Parcel E-1, Existing Housing Area.** There are currently 119 single family units, 12 duplexes, 355 multi-family units, and other community improvements on approximately 118 acres. The Project Owner will demolish 146 multi-family units, renovate 251 units (no renovation is required on 89 existing units), and construct an undetermined number of new single family units within the demolished areas on this parcel to achieve a combined end-state of 723 family housing units among Parcels E-1 through E-4 at Peterson AFB. There are 15 houses that have fiber optic computer cable runs to them; this equipment and lines will be retained and maintained by the Government. There are also 15 houses that have Government-owned and installed telephone cables for secure voice communication; the Government will continue to own, install, and maintain these lines. Title to the existing houses and improvements will be transferred to the Project Owner, the Project Owner will hold the title to newly constructed houses and improvements, and the land will be subleased to the Project Owner for 50 years.


- Parcel E-2, Former Mobile Home Area.** This parcel consists of approximately 13 acres of vacant open space, previously the site of mobile homes. Adjacent to Parcel E-2, Peterson Broadband has a trailer and a satellite farm encompassing less than a quarter acre adjacent to the northernmost portion of the parcel. Within Parcel E-2, there is a Government communication line running along the west side of the parcel from north of the parcel to Stewart Avenue; this line will be retained by the Government. The Project Owner would construct new single family homes on this parcel, to achieve a combined end-state of 723 family housing units among Parcels E-1 through E-4 at Peterson AFB. This area is proposed for key and essential Senior Officers Quarters and prestige units. The Project Owner will hold the title to newly constructed houses and improvements, and the land will be subleased to the Project Owner for 50 years.



- **Parcel E-3, Driving Range, Skeet Range, 302nd Airlift Wing Storage Area, and Contractor Staging Area.**

This parcel consists of approximately 52 acres currently used as a golf driving range, a skeet shooting range, and outdoor storage areas, with associated improvements. The storage and staging areas would be relocated by the base. The driving range, golf cart maintenance facilities, and golf cart storage barn would be relocated by the Project Owner. The skeet range would be conveyed to the Project Owner, who will

need to clean the site to residential standards for all contaminants of concern, including lead from lead shot and polycyclic aromatic hydrocarbons (PAHs) from the clay targets, before the land can be used for family housing. The Project Owner would construct new single family homes on this parcel, to achieve a combined end-state of 723 family housing units among Parcels E-1 through E-4 at Peterson AFB. The Project Owner will hold the title to newly constructed houses and improvements, and the land will be subleased to the Project Owner for 50 years.



- **Parcel E-4, Undeveloped Land.** This parcel consists of approximately 16 acres of vacant, undeveloped open space. The Project Owner would construct new single family homes on this parcel, to achieve a combined end-state of 723 family housing units among Parcels E-1 through E-4 at Peterson AFB. The Project Owner will hold the title to newly constructed houses and improvements, and the land will be subleased to the Project Owner for 50 years.



- **Parcel E-5, Skeet/Archery Ranges.** This parcel consists of approximately 17 acres of vacant, undeveloped open space used as skeet and archery ranges. The Project Owner will be required to remediate lead shot and PAH contamination on the skeet range area before relocating the installation Golf Driving Range to this location at Peterson AFB. The land will be subleased on a short term basis to the Project Owner for the transition phase, not to exceed six years.



- **Parcel E-1-A, Existing Housing Area.** This parcel consists of approximately 1 acre containing 7 housing units that will be demolished and not replaced. This 1-acre parcel will be used to meet force protection requirements for the Youth and Child Development Centers that are adjacent to this parcel. The land will be subleased on a short-term basis to the Project Owner for the transition phase, not to exceed six years.



With the exception of computer network lines and secure government telephone cable to some units, utilities are provided by non-Peterson AFB sources through distribution systems mostly owned and managed by the base. The housing Project Owner would be responsible for coordinating new installation as required, capital upgrades, operations, and maintenance of the utility distribution system within the housing areas. The Government will continue to own, install, and maintain the secure government telephone cable lines and computer network lines. All other utility distribution infrastructure currently owned by the Government will be conveyed to the Project Owner. All carports, sheds, bus shelters, playgrounds, garages, irrigation systems, and all ancillary facilities associated with Peterson AFB family housing communities will be conveyed to the Project Owner.

The City of Colorado Springs owns the land in Parcels E-1, E-2, E-3, E-4, E-5, and E-1-A and leases it to the Government. The sublease of Parcels E-1, E-2, E-3, E-4, E-5, and E-1-A to the Project Owner will be subject to all existing easements, rights-of-way, licenses and other property interests of public record for any purpose.

The new units will all be single-family units. Desired community features include the following: centrally located housing management office, vinyl/composite fencing for all common/perimeter fencing of subleased areas, perimeter fencing constructed to “Style D” type barriers as specified in the Peterson AFB Facilities Excellence Plan, architecturally compatible enclosed bus shelters (minimum of one for every 100 units), restrooms at recreation areas with drinking fountains, a dog park with vinyl-coated chain link fencing and dog fountain, and additional visitor parking in each neighborhood.

2.2 Alternative 2 – No Action

Inclusion of the no action alternative is required by CEQ and Air Force regulations for implementing NEPA. Although the no action alternative does not satisfy the purpose and need for the proposed action, it serves as a baseline against which the impacts of the proposed action and alternatives can be evaluated.

Under the no action alternative, Peterson AFB would not implement the proposed action, and would continue to provide for the family housing needs of its personnel through use of traditional military maintenance and construction procedures. Peterson AFB would continue to obtain funding for family housing through the Congressional authorization and appropriations process. Based on historical trends, it is assumed that the amount of Congressional funding for family housing would not increase and that the number of units in critical need of renovation would continue to grow. Any major changes to or construction of new housing in the future would require that appropriate NEPA analyses be completed before implementing such actions.

2.3 Alternative 3 – Off-Base Privatized Housing

The Air Force has given prospective developers the option of proposing an off-base location for developing privatized housing for Peterson AFB under the MHPI. No specific location(s) have been identified at this time. The latest draft of the request for proposals states the following:

The Air Force prefers that all new construction for [Peterson AFB] be constructed on the Leased Premises; however, the [Project Owner] may propose an additional site off-base. Such an option shall only be considered if the housing would be near [Peterson AFB] and would not adversely impact local schools. If the [Project Owner] chooses this option, the community development design's shall create a network of neighborhoods within the proposed community to include providing a full range of compatible shared recreation and community desired facilities, i.e. community center, parks, playgrounds, etc.

Identification of specific location(s) for this alternative would not be possible until prospective developers' proposals have been submitted to the Air Force, currently projected for Fall 2006.

2.4 Alternatives Identified But Not Considered in Detail

Two additional alternatives were identified but were not concluded to be reasonable, and therefore will not be evaluated in detail in the EA, as follows:

Private Sector Reliance

Under this alternative, Peterson AFB would rely solely on the private sector to meet the housing needs of service members.

The alternative is premised, in part, on the view that competitive marketplace forces would lead to the creation of sufficient affordable, quality family housing. There are several intangible benefits to military personnel and their families living on-post. These include camaraderie and esprit de corps among the military personnel, convenient access to military community services, and a sense of "family" among dependents. In addition, in the Colorado Springs area specifically, tremendous growth and high housing demand has limited the housing available to Peterson's service members, with shortages of rental houses and rental apartments.

As a practical matter, termination of Peterson AFB family housing would prove difficult. If Peterson's family housing were to be terminated over a period of years, in the absence of maintenance funding, the existing housing would become unsuitable due to age or necessity of repairs. Residents could then find themselves living in blighted and partially abandoned neighborhoods. If on-base family housing were to be terminated all at once, it is unlikely the private sector could provide the requisite amount of affordable, quality housing, as well as roads and other support amenities, on short notice.

This alternative is not reasonable and was not further evaluated in this EA.

Reliance on Family Housing at Other Area Military Bases

Another alternative to maintaining the family housing function at Peterson AFB is to rely on military housing proposed for Schriever AFB and existing at USAFA, and/or Fort Carson. However, the two Air Force installations are currently evaluating alternatives for improving their own family housing situation (requirements are for significant renovation at USAFA and new construction at each installation to meet their own needs). Fort Carson is expecting an influx of

up to 10,000 soldiers requiring construction of 250 new family homes, as a result of Defense Base Realignment and Closure Commission decisions in 2005.

In addition, while the proposed housing privatization at USAFA will have an end-state with fewer houses than are currently at the installation, the (1) distance to USAFA exceeds that which would be associated with consistently safe winter commuting to Peterson AFB, and (2) the longer commutes required would not be responsive to the Secretary of the Air Force's recent memorandum addressing fuel conservation:

The President of the United States asked America to conserve fuel to alleviate the temporary fuel shortages caused by the catastrophic effects of hurricane Katrina. To mitigate the impact, the Deputy Secretary of Defense has directed that we take measures that will conserve fuel. All AF organizations shall consider and implement, as operational and mission demands permit, the following actions to conserve fuel: Minimize all non-essential fuel consumption. ... The emphasis should be on reducing consumption of gasoline, the product with the greatest shortages at this time.

This alternative was determined to be not reasonable and was not evaluated further in this EA.

2.5 Summary of Environmental Impacts

Potential impacts resulting from the proposed action and alternatives, based on the analysis details presented in Section 4 of this EA, are summarized in Table 1.

Table 1. Summary of Impact Analysis Results

Resource	Summary of Impact Analysis Results		
	Proposed Action	No Action	Off-Base Privatized Housing
Air Quality	Temporary increase in criteria pollutants from construction. Fugitive dust permits may be required during construction. Slight increase in long-term emissions from unpermitted sources (residential furnaces). No significant impacts.	No impacts.	Impacts are expected to be similar to those of the proposed action (depending on a specific location, which has not been identified); not significant.
Soils, Geology, and Topography	Temporary soil disturbance, in accordance with permit requirements. Beneficial impact on soil quality from remediation in Parcels E-3 and E-5. No significant impacts.	No impacts.	Impacts are expected to be similar to those of the proposed action (depending on a specific location, which has not been identified), except for beneficial impact from remediation of Parcel E-5. No significant impacts.

Resource	Summary of Impact Analysis Results		
	Proposed Action	No Action	Off-Base Privatized Housing
Water Resources	Surface water impacts from temporary soil disturbance would be limited by best management practices. No significant impacts.	No impacts.	Impacts are expected to be similar to those of the proposed action (depending on a specific location, which has not been identified); not significant.
Biological Resources	No significant impacts.	No impacts.	Data gap for potential impacts to vegetation and wildlife, including protected species (a specific location would be required for analysis of this endpoint).
Human Health and Safety	Human health and safety risks associated with area traffic and residential pesticide application would increase; however, these risks would be similar to those posed at current housing locations. Human health and safety risks posed by construction activities can be mitigated and would be short-term. Long-term beneficial impact due to removal of hazardous materials of construction (asbestos and lead-based paint) in current housing. Risk-based remediation of lead and PAH contamination on current skeet range will mitigate potential for risks to future residents on Parcel E-3. No significant impacts.	Contaminated soils in Parcels E-3 and E-5 may not be remediated. Decreased potential for and/or longer period of time to realize long-term beneficial impact due to removal of hazardous substances of construction (asbestos and lead-based paint) in current housing.	Impacts are expected to be similar to those of the proposed action; not significant. Contaminated soil in Parcel E-3 may not be remediated as quickly. Residences containing hazardous materials of construction may not be renovated as quickly.
Solid Waste and Hazardous Materials	Short-term increase in solid and hazardous waste generation during construction and Parcel E-3/E-5 remediation, followed by localized long-term increase in municipal solid waste generation during residential occupation. Widespread removal of hazardous materials of construction from existing residences. No significant adverse impacts.	No impacts.	Impacts are expected to be similar to those of the proposed action; not significant.

Resource	Summary of Impact Analysis Results		
	Proposed Action	No Action	Off-Base Privatized Housing
Noise	Intermittent short-term impacts during construction. Long-term increase in area noise from increased area traffic and residential sources. No significant adverse impacts.	No impacts.	Impacts are expected to be similar to those of the proposed action (depending on a specific location, which has not been identified); not significant.
Cultural Resources	No significant impacts.	No impacts.	Data gap for potential impacts to cultural resources (a specific location would be required for analysis of this endpoint).
Land Use	No significant impacts.	No impacts.	Change from undeveloped land to subdivision with up to 723 houses; no significant adverse impact anticipated, but zoning change may be required, depending on specific location.
Traffic and Transportation	Short-term increase from construction-related traffic. Long-term increase in local community traffic offset by decreased commuter traffic from other areas. No significant impacts.	No impacts.	Impacts are expected to be similar to those of the proposed action; not significant.
Socioeconomics and Environmental Justice	Short-term beneficial impact on employment and income during construction. Public schools have adequate capacity to accommodate increased base residential population. No significant adverse impacts.	No impacts.	Impacts are expected to be similar to those of the proposed action; not significant.

As noted in this summary, there are data gaps for potential impacts to biological resources and cultural resources from the off-base privatized housing alternative, since a specific location would be required for analysis of these endpoints. These data gaps will be addressed when the transaction is finalized, with the potential for impacts to these resources able to be assessed at that time, should this alternative become the Air Force's proposed action.

There would be no significant cumulative impacts.

SECTION 3. AFFECTED ENVIRONMENT

This section describes the existing condition of resources at Peterson AFB, laying the groundwork for the discussions in Section 4 of the potential for environmental impacts to each area.

3.1 Air Quality

This section discusses the climate and meteorology of the area, air quality standards, and existing air pollutant sources.

3.1.1 Climate and Meteorology

Peterson AFB is located near the border of the Great Plains and the Front Range of the Rocky Mountains, which results in a moderate semi-arid climate. The average July temperature is 70 °F and the average January temperature is 28 °F. The area is subject to thunderstorms and heavy rainfall, which primarily occur from May through August. Mean precipitation is about 17.40 inches per year. Most rain occurs from March through September, with peak rainfall occurring in August (NWS 2005a). The most rainfall in a 24-hour period was 3.98 inches on August 4, 1999 (NWS 2005b, NWS 2005c). Total annual potential evaporation is about 25 inches. Relative humidity ranges from about 55% in early morning to 35% in the early afternoon. Prevailing winds are predominantly from the north throughout the year. Wind speeds usually range from seven to ten knots (8 to 12 miles per hour), with the highest speeds occurring in the spring and the lowest in late summer and early fall.

3.1.2 Air Quality Standards

The National Ambient Air Quality Standards (NAAQS), established by the U.S. Environmental Protection Agency (USEPA), and adopted by the Colorado Department of Public Health and Environment (CDPHE), define the maximum allowable concentrations of pollutants that may be reached but not exceeded within a given time period. These standards were selected to protect human health with a reasonable margin of safety. Section 110 of the *Clean Air Act* (CAA) requires states to develop air pollution regulations and control strategies to ensure that state air quality meets the NAAQS established by USEPA. These ambient standards are established under Section 109 of the CAA, and they currently address six criteria pollutants: carbon monoxide (CO), nitrogen dioxide, ozone, lead, particulate matter, and sulfur dioxide. Particulate matter has been further defined by size. There are standards for particulate matter smaller than 10 microns in diameter (PM₁₀) and smaller than 2.5 microns in diameter (PM_{2.5}). Each state must submit these regulations and control strategies for approval and incorporation into the Federally enforceable State Implementation Plan (SIP). Exceeding the concentration levels within a given time period is a violation and constitutes nonattainment of the pollutant standard.

Stationary sources of emissions are categorized as major or minor. A major source emits, or has the potential to emit, 100 tons per year of any air pollutant (40 CFR 52.21, 5 Colorado Code of Regulations (CCR) 1001, Regulation 3, Part A, Section I.B.23.b). A minor source emits or has the potential to emit less than 100 tons per year of any pollutant. Under Title V of the CAA, a

major source must obtain an operating permit. Minor sources do not need an operating permit; however, if they emit two tons per year or more of a pollutant, they are required to obtain an Air Pollutant Emissions Notice (APEN), sometimes referred to as a construction permit.

Hazardous air pollutants (HAPs) are regulated under 40 CFR 61, National Emission Standards for Hazardous Air Pollutants (NESHAP), and 40 CFR 63, NESHAP for Source Categories. A major source, defined as one emitting, or having the potential to emit, 10 tons per year of any single HAP or 25 tons per year total HAPs, requires a permit, and as specified in 40 CFR 63, the implementation of maximum achievable control technology. A minor source is defined as one emitting, or having the potential to emit, less than 10 tons per year of any single HAP or 25 tons per year total HAPs. Minor sources of HAPs whose emissions exceed the threshold defined in CCR 1001, Regulation 3, Appendix A are required to obtain an APEN; this threshold ranges from 50 to 5,000 pounds per year depending on the elevation of the release point above ground level, the distance from the source to the property boundary, the emission point as defined in Section II.B.4 of the regulation (a single point or a composite of multiple points), and the type of HAP (as classified in Appendix B of the regulation).

3.1.3 Air Pollutant Sources

Particulate matter (PM₁₀ and PM_{2.5}) is generated during ground disturbing activities and during combustion. El Paso County requires an air quality permit for fugitive particulate emissions from disturbed ground of more than one acre in size. The permit includes requirements to limit fugitive dust through best management practices, outlined in the El Paso County Land Development Code, Section 51.

If this ground is disturbed for more than 6 months, and is 25 acres or more in size, a Colorado APEN is also required. The APEN would require specific measures to control fugitive dust to the extent technically feasible and economically reasonable. Specific measures are required for onsite unpaved roads (watering, chemical stabilizers, limiting vehicle speeds, or gravelling), controlling dust from disturbed areas (watering, chemical stabilizers, limiting vehicle speeds, revegetation, furrows, wind breaks, temporary compaction, or synthetic or natural covering, such as netting or mulching), and preventing mud and dirt from being carried out onto paved roads (gravel entryways, washing vehicle wheels, or street cleaning).

Limits for other criteria pollutants apply only to permanent stationary sources installed during construction. These limits are specified for attainment or nonattainment areas (CCR Title 5, Chapter 1001, Regulation 3, Part A, II.B.62.a) and are two tons per year of any pollutant in an attainment area.

3.1.4 Regional Air Quality

Peterson AFB is located in the Colorado Springs Metropolitan Area, which lies within the San Isabel Intrastate Air Quality Control Region (AQCR). The region is currently in attainment for all criteria pollutants, but has only been in attainment for CO since 1999 (CAQCC 2003). As part of the redesignation as an attainment area, the Colorado Springs area is under a maintenance plan (last revised in 2003) until 2015 to demonstrate compliance with the CO standard. Under this

maintenance plan, implemented under a SIP and approved by the USEPA, the Colorado Springs maintenance area has a mobile sources emissions budget of 270 tons per day of CO (this increases to 531 tons per day from 2010 to 2015). The emission budget for construction non-road sources is 2.83 tons per day in 2007. The emission budget for point sources (emissions from vents and smokestacks, including natural gas combustion, is 3.34 tons per day in 2007 and 3.84 tons per day in 2010 (CAQCC 2003).

According to the latest monitoring and trends report prepared by the Pikes Peak Area Council of Governments (PPACG 2004), emissions of CO have declined since violations of the standard in 1988. Eight-hour average monitoring results are 4 parts per million (ppm) or less (compared to the eight-hour standard of 9.5 ppm). Emissions of other criteria pollutants are also well below standards, with the exception of ozone. The three-year average of the annual 4th-highest eight-hour average ozone level (this is the value used to determine compliance with standard) has remained at about 85% of the standard (0.088 ppm) (CDPHE 2006a).

Peterson AFB completed an Air Emissions Inventory for calendar year 2004 (USAF 2005b). The installation-wide criteria pollutant totals (actual and potential emissions) are shown in Table 2. Actual emissions were calculated with emission factors and actual usage times for equipment. As defined in 40 CFR 52.21, the potential to emit is the maximum capacity of a stationary source to emit a pollutant under its physical and operational design. For purposes of potential to emit calculations, operating hours for emergency equipment (such as emergency generators) is limited to 500 hours per year by the USEPA. The base has a CAA Title V Operating Permit from the Colorado Air Pollution Control Division that is valid until March 2008 (CDPHE 2003). Peterson AFB is a major stationary source of nitrogen oxides (NO_x), PM₁₀, and volatile organic carbon compounds (VOCs), as the potential to emit these pollutants exceeds 100 tons per year.

Table 2. Installation-Wide 2004 Stationary Air Pollutant Emissions, Peterson AFB

	Emissions (tons per year) ^a						
	PM _{2.5}	PM ₁₀	SO _x ^b	NO _x	VOCs	CO	HAPs ^c
Stationary Sources, Actual	1.94	5.05	0.29	22.11	56.66	15.79	3.12
Stationary Sources, Potential	12.50	29.85	5.70	206.85	148.64	101.65	13.17

^aEmissions include point and fugitive sources.

^bSO_x =sulfur oxides

^cThe largest actual emission of a single HAP is 1.01 tons. The largest potential to emit of a single HAP is 2.08 tons. Source: USAF 2005b.

The base is not subject to the Prevention of Significant Deterioration (PSD) review requirements of 40 CFR 52.21 and CCR Title 5, Chapter 1001, Regulation 3, Part B, Section IV.D.3, because the actual or potential emission of any criteria pollutant does not exceed 250 tons per year.

Peterson AFB is a minor source of HAPs, with total emissions of 3.12 tons per year. HAPs emissions are below the thresholds for specific requirements under 40 CFR 61 and 63 for source categories. The base monitors the amount of HAP emissions and reports them to the State of Colorado in accordance with the operating permit. Most of the HAPs emissions are generated from gasoline storage tanks and refueling, and from chemical usage. The potential to emit HAPs at Peterson AFB is 13.17 tons per year.

3.2 Soils, Geology, and Topography

Geological resources discussed in this section include physical features of the earth such as geology (surface and subsurface features), topography, and soils.

3.2.1 Geology and Topography

Peterson AFB is situated in the Colorado Piedmont section of the Great Plains Physiographic Province. The Southern Rocky Mountain Physiographic Province is located about 10 miles to the west. The Colorado Piedmont is a mature elevated plain, dissected by numerous streams. In the local area, this includes Fountain and Sand Creeks.

The project area is underlain by about 50 to 100 feet of Quaternary alluvium (primarily sand and gravel) from tributaries of the Arkansas River. These deposits are underlain by Upper Cretaceous deposits of the Laramie and Fox Hills Formations that are part of the Denver Basin. The Laramie Formation (about 400 feet thick at Peterson AFB) is composed of sandstone and shale. The sandstone is fine to medium, friable, and carbonaceous. The Fox Hills Formation, which lies beneath the Laramie Formation, consists of sandstone and siltstone interbedded with shale. The sandstone in the lower portions of the Laramie Formation and upper portions of the Fox Hills Formation yields water in a zone of up to 200 feet in thickness. Pierre Shale underlies the Laramie-Fox Hills Formation (USGS 1984, USGS 1995a, USAF 2005c). Deposits of sand and gravel are common in El Paso County. However, most of these are unsuited for commercial use and are rated as poor for fill.

There are no major active faults in the Colorado Springs vicinity; the nearest major faults are located about 80 to 100 miles from the area. The Northern Sangre de Cristo Fault, with a characteristic magnitude (an expected magnitude of earthquake based on fault geology and stress in the fault) of 7.5, is located about 80 miles southwest of the site. The Southern Sawatch Range Fault, with a characteristic magnitude of 7.2, is located about 90 miles southwest of the site. The Cheraw Fault, with a characteristic magnitude of 7.1, is located about 100 miles southeast of the site (USGS 2002, USGS 2004). The U.S. Geological Survey (USGS) calculates the probability of potential ground motion from faults and earthquake events in an area, compared to the motion of an object falling due to gravity. There is a 10% chance that a peak acceleration of 3.5 percent of gravity would be exceeded in 50 years at Peterson AFB (USGS 2003). This would approximately equal a value of V to VI on the Modified Mercalli Scale for earthquake intensity. Earthquakes of this magnitude would typically cause breakage of windows or plaster or other slight damage. On average, this would equal magnitudes in the range of 4.0 to 4.4 on the Richter Scale (this is variable depending on the proximity of the earthquake to the site). Since 1973, there have been 28 earthquakes recorded within 160 kilometers (100 miles) of the site, with magnitudes ranging from 2.1 to 4.5 (USGS 2006).

Overall, elevations in the project areas range from about 6,155 to 6,260 feet above mean sea level, with slopes generally ranging from about 1 to 2%. Localized areas have slopes up to 11%.

3.2.2 Soils

Soils in the project areas were formed in arkosic (derived from quartz- and feldspar-rich granite) sedimentary rocks derived from windblown and stream-deposited sediment. The project area consists of the Blakeland loamy sand soil series (USDA 2004). The Blakeland soils occur on uplands on slight to moderate slopes, generally from 1 to 9%. The texture is loamy sand from the surface to 27 inches, and sand from 27 to 60 inches. Permeability is rapid and runoff is slow. The hazard of water erosion is moderate. This soil does not experience flooding. The hazard of wind erosion is severe, especially when vegetative cover is disturbed. The shrink-swell potential (a measure of the volume change from dry to wet conditions) is low (less than 3%). The Blakeland soils have a severe limitation for excavations due to the high potential for excavations to cave in. Piping, a phenomenon where erosion causes subsurface tunnels in the soil and subsequent subsidence, occurs in these soils when they are disturbed. The potential for piping can be reduced by properly compacting the soil during site preparation and final grading (USDA 1981). The Blakeland soils are somewhat excessively drained. Water removal from these soils is rapid, with a high saturated hydraulic conductivity (the rate of water movement within the soil). These soils are not hydric; that is, they are not wet long enough to periodically produce anaerobic conditions (NRCS 1995). (Hydric soils are one of the three indicators of wetlands, along with hydrology and vegetation.)

As discussed in Section 3.1.3, El Paso County requires a grading permit for fugitive particulate emissions and waterborne sediments from disturbed ground of more than one acre in size. The permit includes requirements to limit erosion and fugitive dust through best management practices, outlined in the El Paso County Land Development Code, Section 51. Erosion control requirements are discussed in Section 3.1.3. Additionally, if a proposed project is anticipated to disturb 25 acres or more for six months or longer, a Colorado APEN is required. Measures to control water erosion (vegetative controls such as maintaining as much vegetation as possible, and structural controls such as sediment traps and basins and ground cover) are also included within permit requirements.

The El Paso County Land Development Code also requires a final site plan for stabilizing steep slopes and limiting storm water runoff from completed construction. Additional requirements for runoff and sediment discharge are discussed in Section 3.3.2.

Soils at the skeet range (parts of Parcels E-3 and E-5) are contaminated with lead and PAHs. Please reference Section 3.6 for a more detailed discussion of these hazardous materials.

3.3 Water Resources

The hydrologic cycle results in the transport of water into various media such as the air, the ground surface, and subsurface. Natural and human-induced factors determine the quality of water resources. Water resources discussed in this section include groundwater, surface water (including storm water runoff), floodplains, and wetlands.

3.3.1 Groundwater

The area's principal unconfined aquifer is in the alluvial sediments of the Fountain Creek Valley. This shallow aquifer ranges in depth from 0.8 feet to more than 100 feet in the Colorado Springs area (USGS 1995b). This aquifer underlies the western half of the existing housing area (part of Parcel E-1 and all of Parcel E-1A) and Parcel E-5. There is not a perennially saturated alluvial aquifer under the eastern half of Parcel E-1, or under Parcels E-2, E-3, or E-4 (EPCPD 2003). The depth to groundwater in the project area is about 30 feet (USAF 2005c). Groundwater in this aquifer flows to the southwest toward Fountain Creek. Perennially saturated portions of this alluvial aquifer near Fountain Creek (about 4.5 miles to the southwest) supply the City of Colorado Springs with some of their drinking water. Peterson AFB obtains its potable water from the City of Colorado Springs.

Colorado Springs lies on the southern edge of the Denver Basin Aquifer System. The aquifer system underlies an area of about 7,000 square miles that extends from Greeley south to near Colorado Springs and from the Front Range east to near Limon. This system consists of four aquifers (Dawson, Denver, Arapahoe, and Laramie-Fox Hills) in five geologic formations and is up to 3,000 feet thick. At the outer edge of the system lies the Laramie-Fox Hills Aquifer, which underlies the project area. The southern boundary of the Arapahoe Aquifer is about 3,000 feet north of the existing housing area. The Denver Aquifer is about 2.5 miles north of the project area and the Dawson Aquifer is about 6.5 miles to the north (USGS 1984, EPCPD 2003).

The Laramie-Fox Hills Aquifer is within the lower part of the Laramie Formation and the upper Fox Hills Formation. The depth to the Laramie-Fox Hills Aquifer varies between 400 and 500 feet along the northern edge of Peterson AFB. This aquifer is about 200 feet thick (USGS 1984). The Denver Basin Aquifer System is hydraulically isolated from the overlying alluvial aquifer by layers of shale in the Laramie Formation. The Laramie-Fox Hills Aquifer is not used as a source of drinking water in the vicinity of Peterson AFB due to low water yields and poor water quality (due to oxygen deficient conditions which give rise to hydrogen sulfide and methane gases) (USGS 1995a).

3.3.2 Surface Water

The project area lies within the Fountain Creek Watershed (USGS hydrologic unit catalog 11020003), which drains into the Arkansas River (located about 35 miles to the south of the project area). The housing area is about 3,400 feet east of the East Fork Sand Creek. The East Fork Sand Creek meets all water quality standards (USEPA 2006). Golf Course Pond 1 is about 900 feet southwest of Parcel E-3. Golf Course Pond 2 is about 900 feet southwest of Parcel E-5. Golf Course Pond 3 is about 1,600 feet southwest of Parcel E-5.

Peterson AFB has a National Pollutant Discharge Elimination System (NPDES) Multi-Sector General Permit (MSGP) to control storm water runoff from facilities with industrial activities at the base. Peterson AFB has prepared a Storm Water Pollution Prevention Plan (SWPPP) to comply with the requirements of the NPDES MSGP (USAF 2002). The MSGP regulates the quality of discharges to outfalls from the base. An inventory of industrial discharges has been prepared and discharges to outfalls are monitored. The MSGP does not specifically cover storm

water runoff from construction activities on the base, but the SWPPP requires best management practices (including sediment barriers, grading controls, and measures to prevent vehicle tracking of sediment) for all construction projects on Peterson AFB (USAF 2002). A separate NPDES permit is required for each construction project on the base, in accordance with the requirements of Section 402 of the *Clean Water Act* (projects impacting one or more acres where storm water runoff would potentially impact waters of the U.S.). Waters of the U.S. include all waters used, previously used, or that could be used for interstate or foreign commerce, including all waters subject to the ebb and flow of the tide; interstate waters, including interstate wetlands; waters whose destruction or degradation could affect interstate or foreign commerce; all impoundments or tributaries of these waters; the territorial sea; and wetlands adjacent to any of these waters. Waters of the U.S. include lakes, rivers, perennial and intermittent streams, mudflats, sandflats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes, and natural ponds (40 CFR 122.2, 33 CFR 328). East Fork Sand Creek is included among waters of the U.S.

Storm water drainage on the main base drains into a series of inlets and buried lines to four outfalls. Three outfalls draining small areas of the western part of the base flow to East Fork Sand Creek. Most of the main base drains to Outfall 4, which flows to Golf Course Pond 3. Storm water runoff from the current housing area (Parcels E-1 and E-1-A) flows into Outfall 4. Storm water runoff from Parcel E-5 and the eastern half of Parcel E-3 flows overland toward Ponds 2 and 3. Storm water runoff from the western half of Parcel E-3 flows overland toward Golf Course Pond 1. Storm water flow from Parcels E-2 and E-4 flows into a drainage ditch on the north side of Stewart Avenue. Some of this runoff would drain into the storm water system to Outfall 4. With the exception of heavy storm events, the majority of overland flow would infiltrate into the ground before reaching the golf course ponds. The golf course ponds are not considered waters of the U.S., but if the ponds reach full capacity after heavy storm events, overflow can outfall to Airport Detention Pond 2 (west of Golf Course Pond 3). Overflow from Airport Detention Pond 2 can outfall to a series of ditches and inlets to Fountain Creek (which is included among waters of the U.S.). An NPDES permit would be required for potential discharge into these ponds from construction. The NPDES permit would require stabilization or structural measures to limit discharge of sediment and erosion to preconstruction levels.

El Paso County requires a grading permit for proposed projects disturbing more than one acre. The permit includes requirements to develop an Erosion Control Plan for sediment control through best management practices outlined in the El Paso County Land Development Code, Section 51. This includes temporary structural and vegetative erosion controls (such as sediment traps or basins and maintaining vegetation to the extent possible) and a final site plan with permanent structures to limit runoff. Measures to control erosion must conform with the El Paso County Drainage Criteria Manual.

3.3.3 Floodplains

Peterson AFB includes 3½ acres that are situated within the Federally delineated 100-year floodplain for East Fork Sand Creek, in the northwest corner of the base. The parcels affected by the proposed action are more than 3,000 feet from this floodplain.

3.3.4 Wetlands

Wetlands are defined as those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions (Federal Interagency Committee for Wetland Delineation 1989). Wetlands are diverse ecosystems that provide ecological benefits by storing spring runoff and heavy summer rains, replenish groundwater supplies, remove water pollutants, and filter and use nutrients. They also provide habitat for many plant and animal species, including economically valuable waterfowl and one-third of the nation's endangered species.

The U.S. Army Corps of Engineers (USACE) regulates those wetlands that are considered waters of the U.S. under Section 404 of the *Clean Water Act* and Executive Order 11990 (Protection of Wetlands). A wetland is not considered to be under USACE jurisdiction (and therefore, waters of the U.S.) based on its use and potential use by migratory bird species alone (68 *Federal Register* 10).

Peterson AFB, in coordination with the USACE, conducted field surveys to identify jurisdictional wetlands on base in 1995 and 2001 (USAF 2005c). The USACE determined that there are no legally defined wetlands on Peterson AFB. Golf Course Ponds 1, 2, and 3 were listed on the 1975 National Wetlands Inventory Map; however, they are not considered wetlands because they were created on existing dryland with no naturally occurring wetland vegetation or hydric soils, and they are rubber-lined. The East Branch of Sand Creek, which crosses the northwest corner of the base, did not meet the USACE wetland criteria.

3.4 Biological Resources

Biological resources consist of an area's vegetation and wildlife, and the habitats (including wetlands) in which they occur. This section is divided into discussions of vegetation, wildlife, and threatened, endangered, and sensitive species.

3.4.1 Vegetation

Vegetation within the current housing areas at Peterson AFB (Parcels E-1 and E-1-A) includes manicured lawns (Kentucky bluegrass), and residential landscaping plants, ornamental shrubs, and mature evergreen and deciduous trees. Parcels E-2, E-3, E-4, and E-5 are considered semi-improved grounds (USAF 2005c) and, as such, they are attended to on a minimal basis. Primary care for these areas includes weed control, native grass planting, minimal mowing, and no irrigation. Semi-improved grounds on Peterson AFB, including Parcels E-2 through E-5, are seeded with a grass mixture to promote ground cover. This mixture includes sideoats grama, western wheatgrass, Texoka buffalo grass, blue grama, and annual ryegrass (USAF 2005c).

During a survey conducted in 2003 (CNHP 2003), ten species of state-listed noxious weeds and one additional invasive species (baby's breath) were identified at or near Peterson AFB. Of those, the following seven species were mapped on the six parcels proposed for privatization of military housing:

- Canada thistle (*Breca arvensis*): Parcels E-1, E-2, and E-1-A
- Russian olive (*Eleagnus angustifolia*): Parcels E-1 and E-2
- Baby's breath (*Gypsophila paniculata*): Parcel E-1
- Bouncingbet (*Saponaria officinalis*): Parcel E-1
- Field bindweed (*Convolvulus arvensis*): All parcels
- Puncturevine (*Tribulus terrestris*): Parcels E-1, E-3, and E-1-A
- Purple loosestrife (*Lythrum salicaria*): Parcel E-1

There are no wetland habitats within the parcels proposed for the MHPI.

3.4.2 Wildlife

Peterson AFB is home to 45 bird species, 25 species of mammals, and 8 reptile/amphibian species. Nineteen species of butterflies were also identified during a site survey (USAF 2005c). None of these species are considered rare, threatened, or endangered by Federal or State standards (USAF 2005c).

3.5 Human Health and Safety

A safe environment is one in which there is little or no potential for death, severe injury or illness, or property damage. Parcels E-1 and E-1-A are residential areas, and thus the primary public safety concern is that from traffic incidents in residential areas. Presently, Peterson AFB personnel mitigate these risks through strict surveillance of posted speed limits. Parcels E-2 and E-4 are largely unoccupied lands, and primary human health and safety risks are those attributable to trips and falls and potential encounters with wildlife. A broadband trailer and satellite farm is located in the southwest corner of Parcel E-2, a little more than 100 feet from the nearest existing housing units; this type of equipment potentially emits microwave radiation. Parcels E-3 and E-5 mainly consist of a skeet and target range. Soils in these areas have been characterized as having lead and PAH contamination. In addition to physical risks posed by a skeet and target range, human health risks associated with the contaminated soils exist. Peterson AFB personnel mitigate these risks through strict access control to the skeet and target range.

Other potential safety risks in the proposed areas are those due to hazardous materials used in residential areas. Pesticides are applied to landscaped areas within Parcels E-1, E-1-A, and E-2. Additionally, asbestos and lead-based paint materials are present in the existing housing units on Parcels E-1 and E-1-A (see Section 3.6.3), and naturally occurring radon is present in some housing units (see Section 3.6.3). Children are more sensitive to some environmental effects than adults, including those resulting from exposure to the hazards identified above.

3.6 Solid Waste and Hazardous Materials

3.6.1 Solid Waste

Solid wastes include all waste materials that are neither hazardous nor toxic, and which are normally disposed of by landfilling or incineration, or are recycled or recovered. In accordance

with Air Force Instruction (AFI) 32-7042, *Solid and Hazardous Waste Compliance* and AFI 32-7080, *Pollution Prevention Program*, Peterson AFB strives to recycle as much of their solid waste stream as possible. The management of solid (non-hazardous) waste on Peterson AFB includes the collection and disposal of solid wastes and recyclable material by contract. There are no active landfills on Peterson AFB; solid waste is taken by a contractor to the Colorado Springs Landfill.

3.6.2 Hazardous Materials and Wastes and Petroleum

Hazardous materials are substances that, because of their quantity, concentration, or physical, chemical, or infectious characteristics, may present a substantial danger to public health or the environment if released. When improperly stored, transported, or otherwise managed, hazardous materials can significantly affect human health and safety, and the environment. These materials are defined within various laws to have specific meanings. For this EA, substances identified as hazardous by the *Comprehensive Environmental Response, Compensation, and Liability Act* (CERCLA), as well as petroleum products, are considered hazardous materials.

The use or a release of a hazardous material usually results in the generation of a hazardous waste. Examples of hazardous wastes generated include contaminated fuels and spent or off-specification solvents, paints, and thinners. Hazardous wastes, as defined for this document, include those substances identified by the *Resource Conservation and Recovery Act* (RCRA). Special wastes include wastes that require special handling (e.g., used oil, dewatered sludge), and are also tracked and managed by Peterson AFB. Hazardous waste management consists of the collection, storage, and transportation of hazardous wastes (as defined by RCRA). Hazardous wastes are managed by Civil Engineering and processed for ultimate disposal through the Defense Reutilization and Marketing Office.

Hazardous wastes and toxic materials in the parcels proposed for privatization are restricted largely to household building materials and typical household chemicals. The use and storage of hazardous materials and wastes including petroleum and oils are not considered a concern for the MHPI parcels at Peterson AFB. As would be expected in any residential area, petroleum staining in areas where vehicles are parked was observed during the Phase I environmental site assessment / environmental baseline survey (EBS). These stains were not significant and were not the result of large quantity releases of petroleum products.

Installation Restoration Program: DoD's Defense Environmental Restoration Program (AFI 32-7020) requires installations to identify, confirm, quantify, and remediate suspected problems associated with past hazardous material disposal sites. CERCLA, as amended by the *Superfund Amendments and Reauthorization Act* (42 U.S.C. 9601, et seq.), provides Federal agencies with the authority to inventory, investigate, and clean up uncontrolled or abandoned hazardous waste sites. Areas that may be contaminated by hazardous materials or wastes through spills or leaks caused by DoD activities are being investigated and cleaned up through the Installation Restoration Program (IRP). The IRP is the Air Force's CERCLA-based environmental restoration program. IRP sites located on Peterson AFB include old landfills, drainage lines, leach fields, spill sites, and a fire training area. There are no U.S. Air Force (USAF) IRP sites located on or immediately adjacent to the parcels proposed for privatization.

Skeet Range: Parcels E-3 and E-5 are located on grounds that serve as a skeet shooting range. The northernmost skeet ranges appear to be used most frequently. The entire skeet range has been identified as a source of lead and PAH contamination. Lead reclamation activities have occurred in the skeet range in the past as a financial incentive for the Gun Club. In October 2003, Peterson AFB Bioenvironmental Engineering personnel sampled surface soils in the skeet range area (see Appendix C). Of nineteen samples collected, seven samples exceeded the residential use standard for lead of 400 milligrams per kilogram (mg/kg), and five samples exceeded the State of Colorado's commercial use standard of 2,920 mg/kg; results ranged from <10 mg/kg to 36,000 mg/kg (USAF 2003). This sampling event was preliminary and did not fully characterize the horizontal and vertical extent of lead contamination for remedial activities.

In 2005, a more detailed investigation of the trap and skeet range was conducted (see Appendix C). The objectives of the study were to investigate the horizontal and vertical extent of lead and PAH contamination in soils, characterize the area for remedial activities, and evaluate lead and PAH levels in background samples. Groundwater in the area was estimated to be at a depth greater than 20 feet below ground surface and was not considered to be impacted by lead and PAH contamination. (CDPHE guidance suggests groundwater within 5 feet below ground surface and surface water within 100 feet of contaminated soils are within the range of potentially impacted waters.) The study calculated the background concentration of lead as 17.15 mg/kg, a value that will present little interference with the residential standard of 400 mg/kg. Thirty soil samples were sieved to remove any lead shot and then sampled for lead contamination. With one exception, lead in the analytical results ranged from 4.51 mg/kg to 1,170 mg/kg. The maximum value, 46,325 mg/kg, was an outlier and likely had a piece of lead shot remaining in the sample (i.e., nuggeting effect). Seven of these samples exceeded the residential standard for lead in soils. A protocol for analyzing soil samples was also developed to utilize a Nitron X-Ray Fluorescent Spectrometer. Additionally, of fourteen soil samples analyzed for leachability of lead in soils, four exceeded the hazardous waste standard of 5 milligrams per liter (mg/L) (USAF 2005d).

Ten background samples were collected for PAH analysis. Of these, two exceeded risk-based screening levels for at least one constituent (benzo(a)pyrene in both samples and dibenz(a,h)anthracene in one sample). Of fifty-two samples collected from the skeet range for PAH analysis (attributable to clay skeet targets), only two passed risk-based screening levels for all analytes; the most common constituent failure was for benzo(a)pyrene (USAF 2005d).

The study concluded that the vertical extent of lead contamination is largely limited to the top twelve inches of soil. Additionally, the study concluded that PAH contamination is prevalent throughout the lateral and vertical extent of the skeet range. It was recommended that lead reclamation activities occur in the area, and that clay target fragments be removed prior to conducting soil remediation activities.

Underground Storage Tanks and Aboveground Storage Tanks: There was no evidence of underground storage tanks (USTs) or aboveground storage tanks (ASTs) observed on any of the MHPI parcels during the site reconnaissance for the EBS, and no evidence of any USTs identified on the parcels during the EBS records review. Multiple USTs and leaking USTs

(LUSTs) are present on other areas of Peterson AFB. These locations are associated with USAF industrial operations. Additionally, a Federal Aviation Administration (FAA) office (listed in state records as "FAA Rocky Mountain SMO," now termed a System Support Center) was identified as having two USTs and one LUST; this site is located on Peterson AFB near the flightline. The LUST site was closed in 1997, and the USTs have also been removed (EDR 2005).

The records review did identify USTs at several locations near the subject parcels. Three USTs are located at Building 1700, about 150 feet north of Parcel E-1. An UST is also located at Building 1, about 1,100 feet north of Parcel E-1. One UST is located at Building 959 (the Medical Clinic), about 600 feet southwest of Parcel E-1. None of these sites have been identified as LUST sites. Four USTs (gasoline) are located at Building 1360 (the AAFES Service Station), about 1,200 feet west of Parcel E-1. One of these tanks was identified as leaking in 1995 (COSTIS 2005). The spill was cleaned up, and the site was closed in 2001. Other USTs at Peterson AFB are located at distances greater than 2,000 feet from the parcels. A gas station located about ¾ mile north of Peterson AFB was identified as a LUST site. Additionally, the Colorado Springs Airport Surveillance Radar site, located east of Peterson AFB, was identified as an UST site.

Asbestos: There are no indications that any asbestos-containing materials (ACMs) were ever disposed on the parcels proposed for privatization. ACMs may be found in wiring, adhesive and caulking, original roofing and felt, vinyl floor tiling, crawlspace liners, and pipe insulation. Of the 493 existing housing units at Peterson AFB, 483 of them were constructed prior to the year 1980. An asbestos survey update was conducted for Peterson AFB housing in 1998. Twenty-five housing units were surveyed for ACMs, all of which were constructed between 1965 and 1975. At 12 units, sampling indicated the presence of ACMs. Two units sampled identified asbestos-containing spray-applied decorative acoustical ceiling plaster. The plaster was described as "in good condition" at both locations. Ten units sampled identified vinyl asbestos floor tiling (AFT), linoleum, and various floor covings that all contained ACMs. At all ten units sampled, the AFTs and flooring were described as "in good condition". Surveying contractor recommendations included notification of the presence of ACMs to occupants and instructions for periodic surveillance of materials and not to disturb or damage ACM-containing materials. Prior to renovation or demolition, all identified friable and potentially friable ACM must be removed in accordance with current USEPA regulations (USAF 1998).

During a storm water drainage upgrade project on a nearby area of Peterson AFB (southwest of Parcel E-1, between Peterson Boulevard and Suffolk Street), asbestos pipe was removed and stockpiled at the base housing playground on the north side of Building 1092, within Parcel E-1. Base personnel confirmed that the piping was positive for asbestos and completed abatement. The same pipe system continues into the old trailer court area, Parcel E-2, where it was abandoned in place when this use was discontinued. This abandoned pipe is considered positive for asbestos. It will have to be sampled and, if confirmed positive for ACMs, properly abated during any construction on Parcel E-2. The previous use of Parcel E-1 (prior to family housing) as the site of a warehouse-type development indicates that there is a potential for abandoned utility lines or other structures to be encountered during construction in that parcel, with the further possibility that ACMs could be present in those structures (if any) as well.

Lead-Based Paint: Lead-based paint was used on interior and exterior surfaces in buildings constructed prior to 1978. Of the 493 housing units at Peterson AFB, 483 of them were constructed before the year 1978. In March 1996 and November 1997, Peterson AFB personnel conducted lead-based paint surveys that included 78 housing units that were built prior to 1981. Of the 78 units surveyed, 65 were found to contain lead-based paint (USAF 1996-1999). Lead-based paint was found at multiple sites on interior and exterior surfaces; the condition of paint on interior and exterior surfaces was not documented. Major renovation occurred at 478 of the 493 housing units from 1991 to 2003. It is expected that both interior and exterior paint surfaces were improved during renovation.

Pesticides: During the EBS (USAF 2006), it was determined that pesticides are being applied on all Peterson AFB parcels proposed for privatization consistent with residential use. Herbicides are applied to lawns and other vegetative areas, and insecticides and rodenticides are applied as required. Larvicides are applied to surface waters on Peterson AFB (none of which are on the housing parcels) to control mosquitoes. Mosquito fogging in residential areas is not conducted. Large-scale pesticide application (such as that typical of farming operations) has not occurred on the Peterson AFB parcels proposed for transfer.

Since 1998, all pest control at Peterson AFB has been performed by contract under the supervision of 21 CES/CEOE. The 21 CES/CEOE grounds maintenance contractor applies 90% of the herbicides used on the installation, while a 21 CES/CEOHE contractor is responsible for all other herbicide applications, as well as for fungicide, rodenticide, and insecticide applications, including those on Silver Spruce Golf Course. Pesticides may be applied to the current driving range to maintain the property. All organizations that maintain grounds on Peterson AFB are responsible for minimizing the potential for non-point source pollution associated with their use of pesticides and fertilizers (USAF 2005c).

Polychlorinated Biphenyls: Polychlorinated biphenyls (PCBs) are synthetic molecular additives used in lubricating oils to enhance cooling characteristics and are typically found in electrical transformers, fluorescent light ballasts, and machinery gear case oils. PCBs were also used as a plasticizing agent. PCBs were used in the U.S. from 1929 to 1979 and are regulated by the *Toxic Substances Control Act* (15 U.S.C. Sec. 2601, et seq.) and, in the absence of a release, are not regulated by CERCLA. The provisions of CERCLA do apply if there is a release of PCBs. Colorado Springs Utilities high voltage electrical transmission lines feed the Base North Gate Primary Switch Station. From the Primary Switch Station, underground high voltage circuits feed the Main Switch Station, which feeds all of the housing units in Parcels E-1 and E-1-A. Small transformers are scattered throughout each of the parcels proposed for privatization, including housing, and none are known to contain PCBs. At Parcel E-2, which had multiple trailer homes removed, all associated transformers were shut down and removed. Multiple underground electrical lines were also excavated and remaining utility wiring was buried. The majority of residential structures have some fluorescent lighting. Although many have been retrofitted with non-PCB ballasts, there remains the potential that some lighting ballasts may contain PCB materials. Personnel interviews during the EBS indicated that all other known sources of PCBs on Peterson AFB have been removed.

Radon: Radon is a naturally occurring odorless, colorless gas with radioactive qualities that may be harmful to human health. Due to the location of Peterson AFB and the geology of the eastern slope of the Rocky Mountains, radon is commonly detected at Peterson AFB facilities. The USEPA action level for radon is 4 picocuries per liter (pCi/L). CDPHE states that, in Colorado, between one third and one half of homes have radon in excess of this action level (CDPHE 2005). USEPA has mapped the U.S. for radon potential, assigning one of three categories to each county (greater than 4 pCi/L, between 2 and 4 pCi/L, or less than 2 pCi/L). El Paso County is assigned to USEPA's Zone 1, indicating a predicted indoor radon screening level greater than 4 pCi/L.

In support of the Radon Assessment and Mitigation Program, Peterson Bioenvironmental Engineering personnel conducted radon sampling between December 1987 and May 1991. The sampling program included all family housing and most work places. Over 94% of base structures, including housing, had radon levels below USEPA's action levels. To achieve a 95% confidence level, four housing units whose sampling results were 2.5 to 3.1 pCi/L were identified for mitigation (USAF 2001). Bioenvironmental personnel plan to perform post-mitigation sampling to measure the success of the mitigation actions.

3.7 Noise

Noise is sound that injures, annoys, interrupts, or interferes with normal activities or otherwise diminishes the quality of the environment. Noise can be described as intermittent or continuous, steady or impulsive, stationary or transient.

The parcels proposed for transfer under the MHPI lie within the boundary of Peterson AFB. Parcels E-1 and E-1-A are presently occupied by residential structures. Parcels E-3 and E-5 are occupied by a skeet and target range and a golf driving range. Parcels E-2 and E-4 are largely undeveloped lands. Industrial operations are minimized in the subject areas. As such, noise levels are consistent with residential areas and occasional gunfire from the skeet range. Noise in the area is primarily intermittent, impulsive, and transient, and is most closely associated with vehicle traffic noise.

The parcels are in the immediate vicinity of the Colorado Springs Municipal Airport, runway 17L/35R. Current residences are located outside of the 65-A-weighted decibel (dbA) noise contour for Colorado Springs Municipal Airport's day-night average sound level (L_{dn}). Other noise sources in the areas are typically temporary and associated with construction activities. These noises are commonly limited to the daytime hours.

3.8 Cultural Resources

Cultural resources are archaeological, historical, and Native American items, places, or events considered important to a culture, community, tradition, religion, or science. Archaeological and historic resources are locations where human activity measurably altered the earth or left deposits of physical or biological remains. Prehistoric examples include arrowheads, rock scatterings, and village remains, whereas historic resources generally include campsites, roads, fences, homesteads, trails, and battlegrounds. Architectural examples of historic resources

include bridges, buildings, canals, and other structures of historic or aesthetic value. Native American resources can include tribal burial grounds, habitations, religious ceremonial areas or instruments, or anything considered essential for the persistence of their traditional culture.

Cultural resources are protected under several Federal regulations, including the following: *Antiquities Act of 1906*; *Historic Sites, Buildings, Objects, and Antiquities Act of 1935*; *National Historic Preservation Act (NHPA) of 1966*; NEPA; *Archeological and Historic Data Preservation Act of 1974*; *American Indian Religious Freedom Act of 1978*; *Archeological Resources Protection Act of 1979*; and the *Native American Graves Protection and Repatriation Act of 1990*. The protection and management of cultural resources on Peterson AFB are also governed by several executive orders; Air Force Policy Directive 32-70, *Environmental Quality*; and AFI 32-7065, *Cultural Resource Management*.

Section 110 of the NHPA requires that Federal agencies assess the significance of cultural resources and assume responsibility for their preservation. Such properties may include archaeological sites, buildings, structures, districts, landscapes, objects, and traditional cultural properties. Compliance with Section 110 involves compiling an inventory of cultural resources whose significance is measured by eligibility for listing in the National Register of Historic Places (NRHP), and managing those significant resources to preserve the integrity of the information they represent. All DoD installations are required to identify and evaluate all cultural resources under its control, including resources from the Cold War Era, to determine which meet the criteria for nomination to the NRHP (specified in 36 CFR 60) (USAF 2004).

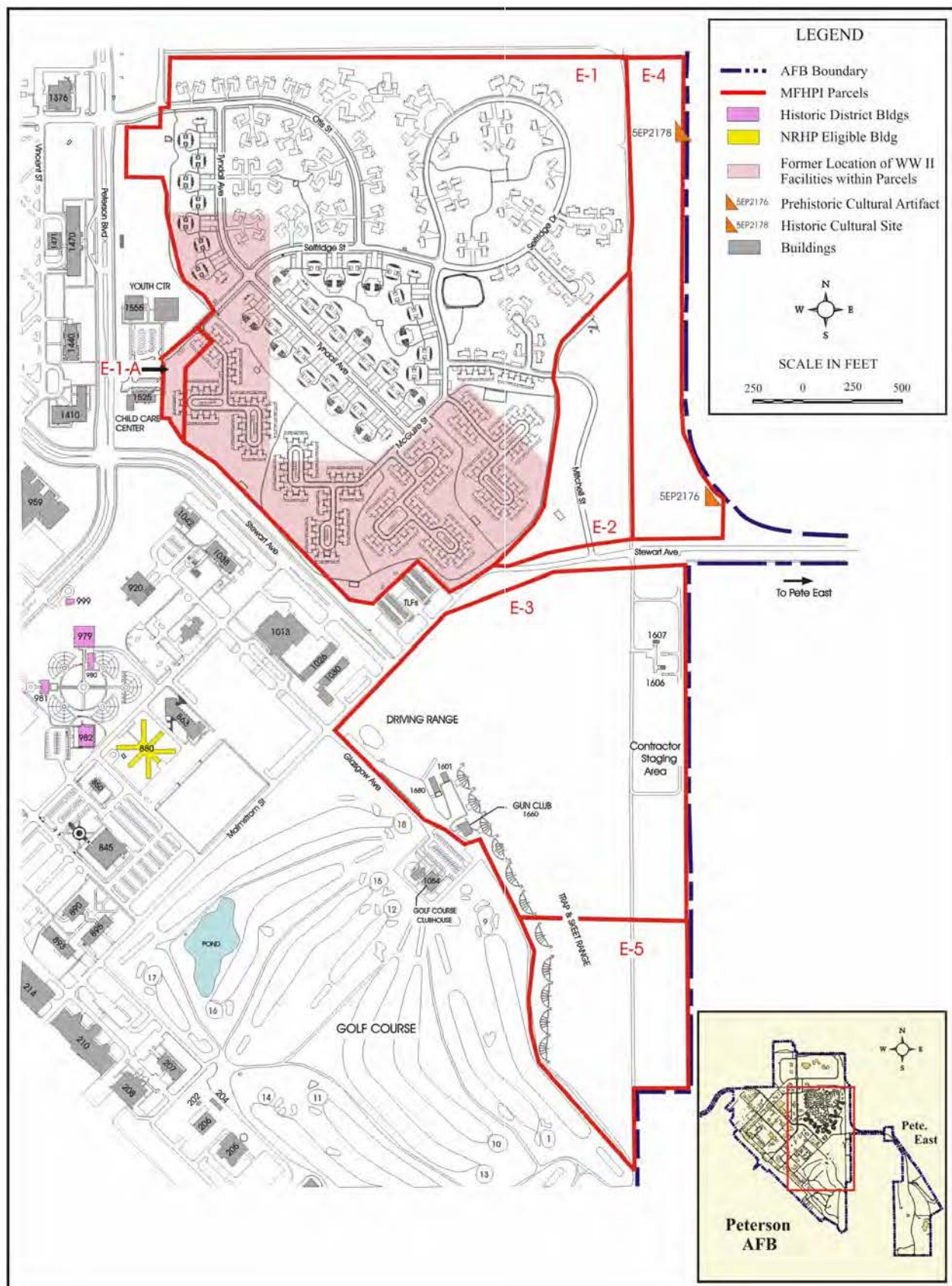
All areas within Peterson AFB have been inventoried for cultural resources and all resources have been evaluated. Surveys indicate findings of prehistoric artifacts (up to A.D. 1750 timeframe) and historic structures (A.D. 1750 to 1950s timeframe) within Peterson AFB.

Prehistoric Resources

Six isolated prehistoric artifacts have been found by various surveys conducted on Peterson AFB. Four of these artifacts are waste flakes, one is a small side-notched projectile point, and one is a projectile point fragment. The small side-notched projectile point (designated as 5EP2176) was located in the southeastern corner of Parcel E-4 (see Figure 3). Two of the waste flakes were found just north of Parcel E-1, and the other artifacts were found on Peterson East. None of these artifacts were eligible for listing on the NRHP. The density of artifacts found on Peterson AFB is considered low (USAF 2004). Table 3 describes cultural resources within the parcels proposed for transfer under the MHPI.

Table 3. Cultural Resources on Parcels

Site Number	Resource Type	Description	Parcel Location
5EP2176	Prehistoric Artifact	small side-notched projectile point	SE ¼ of E-4
5EP2178	Historic Site	series of soil conservation contour ditches	NE ¼ of E-4



Historic Resources

Six historic sites are located on Peterson AFB. These include part of a railroad spur from Manitou Springs to Colorado Springs, World War II hangars along the flightline, a historic trash dump, a historic foundation, a series of soil conservation ditches, and the Historic District. The series of soil conservation contour ditches (designated as 5EP2178) was located in the northeastern part of Parcel E-4 (see Figure 3). Only one of these, the Historic District, was recommended for inclusion on the NRHP.

The Historic District was designated on November 15, 1988; was listed on the NRHP on November 14, 1996; and covers 8.6 acres near the center of base (about 900 feet southwest of Parcel E-1 and 1,200 feet west of Parcel E-3; see Figure 3). The District consists of five buildings (979, 980, 981, 982, and 999) that were part of the original Colorado Springs Municipal Airport (see Table 4). Buildings 979, 981, 982, and 999 are contributing (eligible for the NRHP as individual buildings) and Building 980 is non-contributing (not eligible for the NRHP as an individual building). Building 980 is listed as part of the Historic District but is non-contributing for the NRHP due to its somewhat later construction date (about 1950).

Table 4. Historic District Buildings

Building	Year Constructed	Current Use	Historical Significance
979	1928	Exhibit, storage, and maintenance facility for the Peterson Air & Space Museum.	First known permanent structure at the Municipal Airport. Served as an airplane hangar.
980	Late 1940s – early 1950s	Administrative and storage facility for the Peterson Air & Space Museum	Used by the City of Colorado Springs as a snow removal vehicle maintenance building.
981	1940-1941	Peterson Air & Space Museum	The Municipal Airport Terminal Building.
982	1928	Office building, base contracting	Served as a hangar for guests' airplanes.
999	1929	Used by the Peterson AFB Billeting Office to house Distinguished Visitors.	Administrative office, caretaker's residence, and terminal with facilities for pilots and passengers grounded by inclement weather.

Building 880 meets the criteria for eligibility of inclusion in the NRHP because of its unique mission associated with air reconnaissance and tri-metrogon mapping. Building 880 is about 800 feet west of Parcel E-3 and about 1,100 feet southwest of Parcel E-1 (see Figure 3). In a 1994 survey, Building 880 was determined to be potentially eligible for inclusion into the NRHP. The other World War II buildings (hangars along the flightline) have not retained their integrity or are of temporary construction. None of the Cold War-era facilities meet the stringent NRHP criteria for facilities less than 50 years of age (36 CFR 60.4g). No other historic sites have been recommended as eligible for inclusion on the NRHP. However, there are other buildings at Peterson AFB that were not yet old enough to be evaluated as historic resources in 1994 when the last survey was performed.

Temporary World War II (WWII) facilities were located in most of the main area of Peterson AFB. Figure 3 shows the extent of these former WWII facilities within the parcels proposed for the MHPI. The usage and description of these facilities are unknown, as are the years they were constructed and deconstructed. With the exception of the Historic District, Building 880, and a few facilities along the flightline (USAF 2004), these facilities no longer exist. It is likely that the WWII facilities located within the parcels proposed for sublease were deconstructed prior to the construction of current housing; they did not appear on maps generated after the late 1960s to mid 1970s.

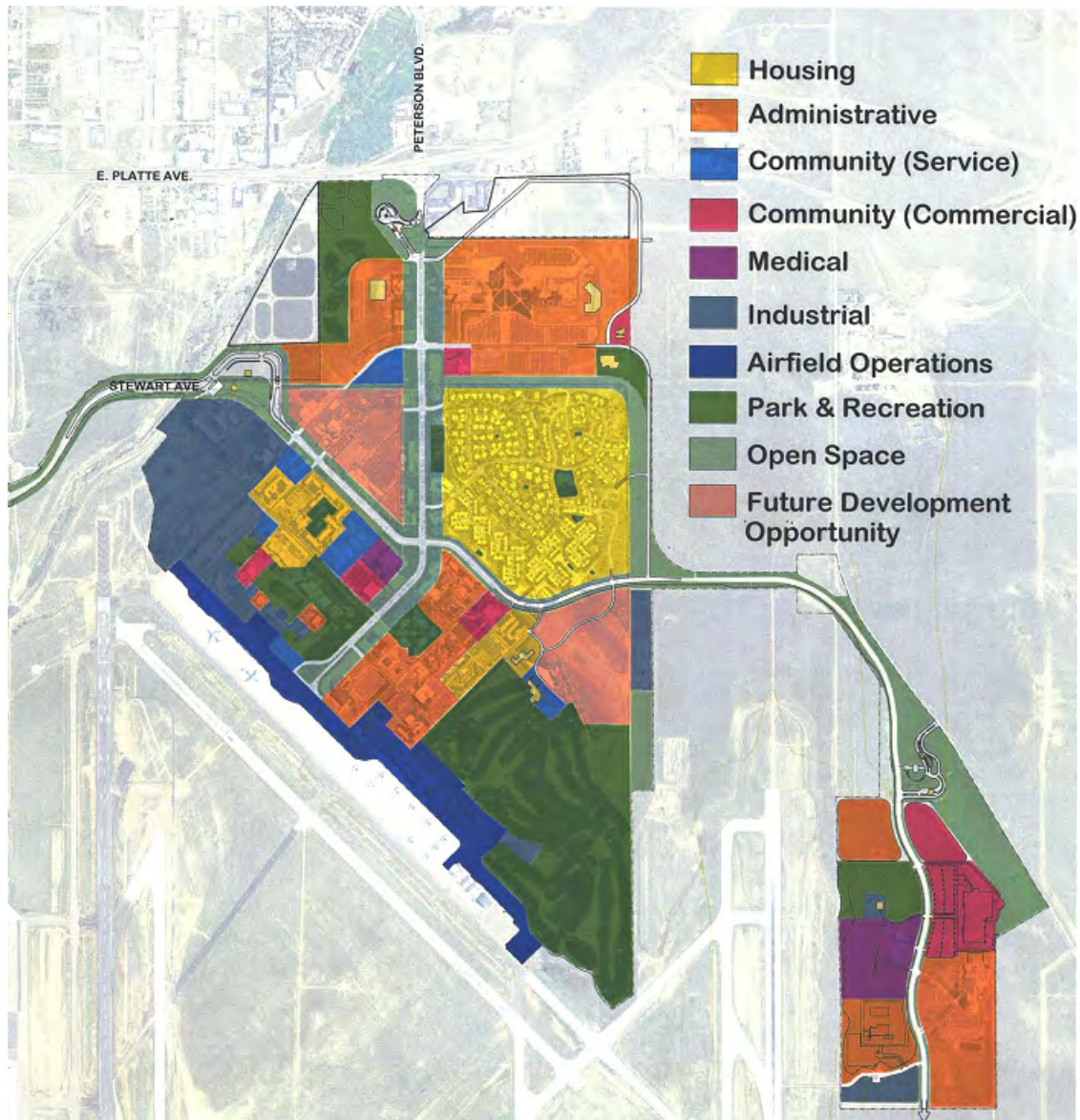
3.9 Land Use

Land use consists of natural conditions or human-modified activities occurring at a particular location. Land use categories include residential, commercial, industrial, transportation, communications and utilities, agricultural, institutional, recreational, and undeveloped areas. Management plans and zoning regulations determine the type and extent of land use allowable in specific areas and are often intended to protect specially designated or environmentally sensitive areas.

The base encompasses approximately 1,295 acres of land—201 acres fee owned and 1,094 acres leased from the City of Colorado Springs. Land use on-base is governed by the Land Use Component of the Base General Plan (USAF 2005e). Thirteen land use categories are defined for Peterson AFB. The majority of land at Peterson AFB is open space and outdoor recreation (see Figure 4).

Land Use	Acreage
Administrative	89
Aircraft Operations/Maintenance	75
Airfield	46
Community (Commercial)	79
Community (Services)	26
Housing (Military Family Housing)	138
Housing (Unaccompanied)	26
Industrial	100
Medical	2
Open Space	379
Outdoor Recreation	270
Special Space Mission	55
Water	5

Land use on Parcels E-1 and E-1-A (about 119 acres) is predominately military housing, with a small area of outdoor recreation near the center of Parcel E-1. Parcel E-2 (about 13 acres), the site of the former mobile home court, is mostly vacant land adjacent to the military housing family area. Parcel E-3 (about 52 acres) is about 44 acres of outdoor recreation (the golf driving range and skeet range), and about 8 acres of industrial land use (storage areas) along the eastern edge of the parcel. Parcel E-4 (16 acres) is undeveloped vacant land. Parcel E-5 (17 acres) is outdoor recreation, with part of the skeet range located there.



Source: USAF 2005e

Figure 4. Existing Land Use at Peterson AFB

The existing military housing area contains 202 housing quarters for 493 families. This area is east of Peterson Boulevard and north of Stewart Avenue, south of the Command Area (Paine Street). The family housing area is currently constrained for further expansion by the base boundaries near the east edge of the parcel, airfield noise restrictions, and adjacent development to the north, south, and east.

Off-base land use consists of commercial and industrial uses to the north of the base, mixed land use to the west (commercial, industrial, residential, and some open space), the Colorado Springs Municipal Airport to the south, and undeveloped land to the east. Much of the land to the east is

expected to develop in the future as development plans are approved and infrastructure is extended to these areas.

Future Development Needs

Space and facilities on Peterson Main presently are reserved for limited growth of base support functions and for programmed expansion of existing mission functions, in accordance with approved long-range plans such as the Super Block and Triangle Study. Land in the Peterson East area has been set aside primarily to accommodate future new missions and additional base support. The challenge in the future is to maintain harmonious land use patterns as demands for new facility sites drive infilling of existing open spaces in the present built-up area and as expansion occurs in the undeveloped Peterson East area. Land will be required for siting of programmed administrative and Air Force Space Command missions, for expansion of industrial and community facilities to improve base support capabilities for additional family housing, and for continued growth of the 302nd Airlift Wing. At the same time, preservation of open space and recreational areas is essential to sustain the quality of life that makes Peterson AFB an attractive place to live and work. Proposed housing needs offer limited areas for construction of new housing. Housing expansion space is only available to the east and southeast of current housing (Parcels E-2 and E-4) and to the south of Stewart Avenue at the driving and skeet shooting ranges (Parcel E-3).

3.10 Traffic and Transportation

Traffic and transportation issues refer to the movement of vehicles and humans throughout a road or highway network. None of the parcels proposed for transfer under the MHPI is directly served by major interstate or U.S. highways. The parcels are currently accessed by paved roads on Peterson AFB.

Traffic in all areas is dominated by personal vehicles. Construction and heavy equipment traffic are limited in the housing parcels, typically occurring during specialized project activities. Traffic in and around the parcels is typically highest during daylight hours and is maximized during morning and afternoon rush hours. Traffic does occur at other times, but is qualified as “light” during off-hours.

El Paso County’s 2004 Major Transportation Corridors Plan reported that U.S. Highway 24 near Peterson AFB is considered a congested road and all other roads near Peterson AFB are considered uncongested roads (EPCDOT 2004). The same study predicted that, between 2000 and 2030, construction of new dwelling units would primarily be near Marksheffel Road. The County’s plan calls for widening area roads to four-lane or six-lane roads in the base’s vicinity.

Available traffic counts reported by El Paso County (EPCDOT 2005) are summarized in Table 5.

Table 5. Local Traffic Counts

Road Counted	Cross Road	Direction from Intersection	Average Daily Traffic Volume	Date Reported*
Peterson Road	U.S. Highway 24	North	6,752	10/29/03
Peterson Road	U.S. Highway 24	South	7,345	10/29/03

*Most recent data reported if more than one study conducted at location.

3.11 Socioeconomics and Environmental Justice

3.11.1 Population

El Paso County has the same geographic boundary as the Colorado Springs Metropolitan Statistical Area (MSA). The county had an estimated total population in 2004 of 539,225 (USBC 2005) and has shown an average annual increase in the last 20 years of 2 to 3% (PPACG 2005). This growth is predicted to continue at a slower rate of 1 to 2% annually over the next 25 years (PPACG 2005).

The 2004 American Community Survey (USBC 2005) reported demographic characteristics for El Paso County, the State of Colorado, and the United States, as summarized in Table 6.

In 2004, there were 209,000 households in El Paso County. The average household size was 2.6 people, compared to an average of 2.4 people in Colorado and the same as the nationwide average. Families (both married-couple families and other families) made up 69% of the households in El Paso County, compared to 64% in Colorado and 67% nationwide (USBC 2005).

Table 6. Demographic Characteristics of County, State, and Nation

	El Paso County	State of Colorado	U.S.
Total population	539,225	4,498,611	285,691,501
Age (years)			
<5	44,397 (8.2%)	337,719 (7.5%)	20,008,152 (7.0%)
5 to 14	82,310 (15.3%)	644,897 (14.3%)	40,743,721 (14.3%)
15 to 19	38,524 (7.1%)	293,076 (6.5%)	19,077,645 (6.7%)
20 to 64	325,375 (60.3%)	2,792,381 (62.1%)	171,656,682 (60.1%)
>64	48,619 (9.0%)	431,078 (9.6%)	34,205,301 (12.0%)
Median age (years)	33.5	34.5	36.2
One race	520,690 (96.6%)	4,394,381 (97.7%)	280,285,784 (98.1%)
White	436,106 (80.9%)	3,755,623 (83.5%)	216,036,244 (75.6%)
Black or African American	36,427 (6.8%)	178,731 (4.0%)	34,772,381 (12.2%)
Native American and Alaska Native	3,719 (0.7%)	30,148 (0.7%)	2,151,322 (0.8%)
Asian	13,784 (2.6%)	113,570 (2.5%)	12,097,281 (4.2%)
Native Hawaiian and other Pacific Islander	1,506 (0.3%)	7,529 (0.2%)	403,832 (0.1%)
Other	29,148 (5.4%)	308,780 (6.9%)	14,824,724 (5.2%)
Two or more races	18,535 (3.4%)	104,230 (2.3%)	5,405,717 (1.9%)
Hispanic or Latino	67,740 (12.6%)	862,631 (19.2%)	40,459,196 (14.2%)

3.11.2 Employment and Income

The unemployment rate in El Paso County was estimated at 7.1% for 2004; the state and national unemployment rates were 7.1% and 7.2%, respectively (USBC 2005). In 2004, the County's three largest employers were military: Fort Carson with 15,159 jobs, USAFA with 6,410, and Peterson AFB with 5,542 (PPACG 2005). In 2004, for the employed population 16 years and older, the leading industries in El Paso County were educational, health, and social services (16%) and retail trade (15%) (USBC 2005). The median income of households in El Paso County was \$47,836, compared to state and national medians of \$48,198 and \$44,684, respectively (USBC 2005).

3.11.3 Housing

Of the 227,386 housing units in El Paso County in 2004, about 7.9% was vacant; the corresponding vacancy rate for the State of Colorado was 8.0% (USBC 2005). Approximately 65% of occupied housing units in El Paso County are owner-occupied, and the homeowner vacancy rate stood at 1.8% in 2004. The rental vacancy rate was 11.2%, which was somewhat higher than the rate for the State (9.2%) (USBC 2005). The median monthly rent in the county was \$682, with 40% of renters paying 35% or more of their income for rent (USBC 2005).

3.11.4 Public Schools

Colorado Springs School District #11 operates 65 schools (NCES 2006). The district schools serving Peterson AFB's location are Monroe Elementary, Emerson/Edison Charter School or Russell Middle School, and Mitchell High School, although parents may apply, on a space available basis, for their children to attend any school in the district other than the one designated by their address (CSSD11 2006). Total district-wide student enrollment in the 2003-2004 school year was 31,840. There are 1,917.9 full-time equivalent (FTE) teachers in the district and an overall student-teacher ratio of 16.6 (NCES 2006). Details for the four schools attended by Peterson AFB students are summarized below (NCES 2006):

- Monroe Elementary School has 30.2 FTE teachers and 421 students in pre-kindergarten through fifth grade.
- Emerson-Edison Junior Charter School has 47.7 FTE teachers and 593 students in grades six through eight.
- Russell Middle School has 44.7 FTE teachers and 829 students in grades six through eight.
- Mitchell High School has 82.4 FTE teachers and 1,706 students in grades nine through twelve.

The schools are all located in Colorado Springs, with distances from Peterson AFB as follows: Monroe Elementary is approximately 3.6 miles west, Emerson-Edison Junior Charter is approximately 2.7 miles west, Russell is approximately 6.3 miles northwest, and Mitchell is approximately 3 miles northwest.

The district has purchased land for development of a new elementary school to be located on Hathaway Street, approximately 0.9 miles from Peterson AFB's north gate. The school is being built to accommodate students from a local housing development, as well as those from Peterson AFB. It is expected to begin operating in the fall of 2007.

Colorado Springs School District #11 currently supports 175 elementary, 59 middle school, and 34 high school students from Peterson AFB (USAF 2005f).

SECTION 4. ENVIRONMENTAL CONSEQUENCES

4.1 Air Quality

The analysis was based on a review of existing air quality in the region, information on Peterson AFB air emission sources, projections of emissions from the proposed activities, and a review of the Federal and Colorado regulations for air quality.

Proposed Action

Demolition of some existing units and construction of the proposed housing would generate emissions of criteria pollutants from demolition, grading and excavating operations, construction equipment, trucks driving on paved and unpaved roads, and worker vehicles. Up to 200 acres in Parcels E-1, E-2, E-3, E-4, and E-1-A would be disturbed with demolition and construction of housing and installation of utility lines. Up to 17 acres would be disturbed when relocating the base golf driving range to Parcel E-5. Fugitive dust emissions (including PM_{2.5} and PM₁₀) would be generated from demolition, grading and fill operations, and truck trips on paved and unpaved roads during construction. The Project Owner must obtain a grading permit for fugitive particulate emissions from El Paso County for disturbing more than one acre of ground (for each of the proposed projects). As discussed in Section 3.1.3, this permit will require the completion of a drainage plan and an erosion control plan. The erosion control plan will include mandatory practices to limit soil erosion (from wind and water). Some of the required measures would control fugitive dust. A Colorado APEN would be required for construction if grading and excavating would disturb more than 25 acres for longer than six months (the time of land disturbance begins with initial grading and clearing and ends when the disturbed ground is stabilized through compaction or revegetation). This APEN, if applicable, will require the implementation of fugitive dust control measures from onsite unpaved roads, disturbed soil, and mud and dirt on paved roads adjacent to the site. These measures include application of water and chemical stabilizers, revegetation, temporary furrows, and synthetic or natural coverings (netting or mulching) to disturbed areas as needed, to reduce fugitive dust (a source of PM_{2.5} and PM₁₀) levels by 80% from uncontrolled levels. Emissions of particulates from construction would not be significant. Emissions of other criteria pollutants, including ozone precursors, would be minor and temporary, and would not be significant (see Table 7 and Appendix B).

Table 7. Estimated Emissions from Construction

	Estimated Emissions (tons per year)						
	PM _{2.5}	PM ₁₀	SO _x	NO _x	VOCs	CO	HAPs
Proposed Action	0.38	1.50	0.89	4.10	0.34	2.61	0.08

There would not be a substantial change in stationary source emissions. Estimated emissions from natural gas combustion (furnaces, water heaters, and appliances) in the additional 383 housing units would slightly increase emissions from point (stationary) sources at Peterson AFB (see Table 8 and Appendix B). Emissions from residential furnaces installed in new housing units would be below the permit threshold. No new permitted stationary sources would be added; therefore, no APENs for criteria pollutants or HAPs will be required.

Table 8. Estimated Emissions from Stationary Sources (Natural Gas)

	Estimated Emissions (tons per year)					
	PM ₁₀	SO _x	NO _x	VOCs	CO	HAPs
Actual Title V emissions	2.80	0.28	21.97	17.35	15.72	0.40
Proposed action ¹	0.05	0.00	0.65	0.04	0.28	0.01
Total emissions including proposed action	2.85	0.28	22.62	17.39	16.00	0.41
Potential Title V emissions	27.05	5.70	206.30	70.26	101.46	6.83
Proposed action ²	0.10	0.01	1.30	0.08	0.55	0.03
Potential emissions including proposed action	27.15	5.71	207.60	70.34	102.01	6.86

Note: Actual and potential emissions are for comparing emissions to Title V thresholds, and do not include fugitive emissions per 40 CFR 51.165. These are current basewide emissions from stationary point sources.

¹ Emissions from natural gas consumption (space heating, water heaters, and appliances) in the proposed 383 additional housing units. See Appendix B for details.

² Potential emissions from proposed action are based on doubling emissions estimates.

Peterson AFB, as part of the Colorado Springs Metropolitan Area, is located within a maintenance area for CO. Emissions would be regionally significant if they exceeded 10% of the inventory for any affected pollutant (in this case, CO). The SIP budget for mobile sources of CO in the Colorado Springs Metropolitan Area is 270 tons per day (98,550 tons per year) (531 tons per day beginning in 2010). Emission budgets from all relevant sources are shown in Table 9. Emissions from the proposed action (construction and operation; see Appendix B) would not comprise 10% of the daily inventory and are not regionally significant.

Table 9. Estimated CO Emissions Compared to Emission Inventory for Colorado Springs Maintenance Area

	CO Emissions (tons per year)		
	Emission Inventory ¹	Regionally Significant	Proposed Action
Non-road construction	1,032.95 (1,029.3) ²	103.30 (102.93)	1.98
Mobile emissions construction)	98,550.00 (193,815.00)	9,855.00 (19,381.5)	0.63
Point source (stationary) ³	1,219.1 (1,401.6)	121.91 (140.16)	0.28

¹ Source: CAQCC 2003.

² Emission inventory values in parentheses are for 2010 inventory, others are for 2007 inventory.

³ Point source emissions are from furnaces, water heaters, and appliances combusting natural gas in the 383 additional housing units under the proposed action. Emissions from existing units are assumed to remain constant.

Peterson AFB would remain below PSD thresholds, as actual emissions and the potential to emit would remain below 250 tons for criteria pollutants (see Table 8). Long-term emissions from stationary sources would only slightly increase and would not be significant.

Estimated emissions would not exceed the NAAQS or Colorado Ambient Air Quality Standards due to the amount of criteria pollutants generated, the relatively large area in which the emissions would occur, the dispersive meteorological conditions (winds average between 8 and 12 miles per hour) in which the emissions would be generated, and the timeframe in which the emissions

would be generated (over a period of several years). Therefore, the focus of the analysis centers on conformity with the SIP for the CO maintenance area.

Conformity thresholds, as defined in 40 CFR 51, Subpart W, are used to determine conformity with a SIP. The threshold for CO is 100 tons per year. Estimated emissions from the proposed action are less than this threshold and would conform to the SIP, and are not significant. The proposed action is not regionally significant and the total direct and indirect emissions would be below the 100 tons per year de minimis threshold for CO. Therefore, this project is exempt from further conformity analysis pursuant to 40 CFR 93.153.

Construction equipment would generate small amounts of HAPs. These emissions would not be significant. Long-term emissions of HAPs would not increase as a result of the proposed action. Peterson AFB would remain a minor source for HAPs, as actual emissions or the potential to emit a single HAP would remain below 10 tons per year, and the actual emissions or potential to emit all HAPs would remain below 25 tons per year. Impacts to air quality would not be significant.

No Action Alternative

Emissions of criteria pollutants and HAPs would remain the same as at present under the no action alternative. Any future construction and demolition of housing will require the same regulatory compliance as that listed above for the proposed action, and any associated emissions are expected to be less frequent, with actions occurring intermittently over a longer period than those described under the proposed action. Impacts from the no action alternative would not be significant.

Off-Base Privatized Housing Alternative

Emissions from constructing the proposed housing off-base would be greater than those from the proposed action. Fugitive dust (including PM_{2.5} and PM₁₀) would be generated from demolition, grading and fill operations, and truck trips on paved and unpaved roads during construction. Emissions of particulate matter would be somewhat higher than on-base, due to more new construction and grading of land (as compared to renovation of some units on base and continued use of some existing units). The contractor would be required to obtain the necessary permits, including the County grading permit and an APEN, as applicable. Impacts to air quality are not likely to be significant.

4.2 Soils, Geology, and Topography

Geological studies, soil surveys, previous EAs, a USGS topographical map, and topographic contours obtained from Peterson AFB were reviewed to characterize the existing environment. Construction activities that could influence geological resources were evaluated to predict the type and magnitude of potential impacts. The predicted post-construction environment was compared to the existing environment and the change was evaluated to determine if significant changes in any existing conditions would occur.

Proposed Action

The proposed action would result in up to 200 acres in Parcels E-1, E-2, E-3, E-4, and E-1-A being disturbed during demolition, renovation, and construction of housing areas. Up to 17 acres would be disturbed when relocating the base golf driving range to Parcel E-5. The proposed action will require that the Project Owner obtain an El Paso County grading permit and, if 25 or more acres were disturbed for more than 6 months, an APEN from the State of Colorado. The demolition and construction activities would take place in areas with slight to moderate slopes, with a moderate to severe risk of erosion.

The El Paso County grading permit includes mandatory controls to reduce potential erosion. Permit requirements would include a drainage plan to control storm water runoff (and potential erosion) during construction. Storm water runoff could be controlled by sediment barriers such as silt fences or straw bales, or structural controls such as a temporary sediment basin. Measures to control erosion must conform with the El Paso County Drainage Criteria Manual. The El Paso County Land Development Code also requires a final site plan for stabilizing steep slopes and limiting storm water runoff from completed structures. These best management practices would be implemented in accordance with county requirements. If an APEN is required, further measures to control wind erosion and fugitive dust would also be implemented. These controls could include daily watering or chemical stabilization of exposed surfaces, maintaining existing vegetation as much as possible, and revegetating sites as soon as possible, limiting vehicle speeds, or gravelling temporary roads, wind breaks, temporary compaction, or synthetic or natural covering, such as netting or mulching. Impacts to geological resources would not be significant. In accordance with permit requirements and best management practices, topsoil would be restored and vegetation would be reestablished to reduce the potential for erosion. Long-term soil productivity would be significantly impacted. Further permit requirements and potential impacts to hydrogeology and groundwater are discussed in Section 4.3.

Soils at the site of the skeet range on Parcel E-3 would be remediated prior to developing any housing. Any lead in the soil would be removed for recycling or otherwise remediated in accordance with all applicable regulations. Past studies of the lead contamination have indicated that the lead is largely limited to the upper 12 inches of soil in limited areas. PAH contamination has also been identified at the skeet range and would be remediated as part of the proposed action. Removal or remediation of the lead and PAHs, and regrading the soil, as needed, after remediation would not significantly impact the soil. Section 4.6 discusses the remediation of lead and other materials in more detail. The driving range and support buildings, golf cart maintenance facilities, the golf cart storage barn, and contractor storage areas would be demolished and relocated under the proposed action. Regrading the soil after demolition of structures would not significantly impact the soil. There is no known soil contamination in these areas.

As discussed in Section 3.2.1, there are no major faults in the project area. The risk of potential earthquake damage is slight, with the expected magnitudes of any seismic events in the range of 4.0 to 4.4 on the Richter Scale (V to VI on the Modified Mercalli Scale). Seismic design parameters would not be required. Impacts from seismicity would not be significant.

No Action Alternative

The proposed demolition and construction of housing would not occur, or would occur over a longer timeframe, under the no action alternative; therefore, geological resources would not be impacted. Soil in Parcels E-3 and E-5 would continue to have lead and PAH contamination.

Off-Base Privatized Housing Alternative

Impacts from constructing the proposed housing off-base would likely be similar to those from the proposed action. The amount of soil disturbed would likely be greater because more new housing would be constructed (as compared to renovation of some units on-base and reuse of some existing units). The contractor would be required to obtain an El Paso County grading permit and implement best management practices to control erosion. An APEN from the State of Colorado could also be required. The potential significance of impacts would depend upon the site selected and characteristics of the developer's proposal for the off-base site, but permit requirements and best management practices would likely reduce the potential for impacts to the insignificant level. Soil in Parcel E-3 would continue to have lead and PAH contamination. Soil quality in Parcel E-5 would be improved as a result of remediating the lead and PAH contamination on this section of the skeet range and converting to a driving range under a short-term sublease; see Section 4.6.

4.3 Water Resources

Documents and maps describing the topography, watersheds, aquifers, and base drainage were examined. The review focused on the proximity of the proposed activities to surface waters, hydrogeology in the project area, and water quality in the local area, and evaluated the effects of the actions with regard to those factors. Regulatory requirements and the need for permits were also reviewed.

Proposed Action

The unconfined alluvial aquifer underlies the western half of the existing housing area and Parcel E-5, where the driving range would be relocated. The alluvial aquifer does not underlie the eastern half of the housing area and Parcels E-2, E-3, and E-4 (see Section 3.3). The depth of the alluvial aquifer, where present, is about 30 feet. Excavations for the proposed action would likely be limited to about 8 to 10 feet and would not directly impact the surficial aquifer. As discussed in Section 3.3.1, the Laramie-Fox Hills Aquifer (part of the Denver Basin aquifer System) underlies the project area. The Laramie-Fox Hills Aquifer ranges between 400 and 500 feet deep along the northern edge of Peterson AFB and would not be impacted. The Arapahoe, Denver, and Dawson Aquifers would not be impacted by the proposed action.

Due to the limited area of excavation over an aquifer, impacts to the hydrogeologic properties of the aquifers (recharge and hydraulic conductivity) would not be significant. A spill or leak of fuel or lubricants is not likely during grading and construction in this area, but if one occurs, it should be cleaned up immediately, in accordance with the Spill Response Plan, to prevent potential contamination of the aquifer. Given the small amount of oil and fluids used by

construction equipment, and the depth to groundwater, where present, impacts would not be significant.

As discussed in Section 3.3, storm water in the current housing area drains into a series of inlets and pipes, and empties to Outfall 4 at Golf Course Pond 3. Storm water runoff from the other parcels flows toward the golf course ponds. The golf course ponds are not waters of the U.S., but the Project Owner would be required to obtain an NPDES permit for the proposed action because, if Golf Course Pond 3 reaches capacity after a heavy storm, it overflows to Airport Detention Pond 2 which can outfall to Fountain Creek, which is among the waters of the U.S. In accordance with the SWPPP, to meet the requirements of the NPDES MSGP, best management practices (including sediment barriers, grading controls, and measures to prevent vehicle tracking of sediment) are required for all construction projects on Peterson AFB (USAF 2002). The Project Owner would also be required to obtain an El Paso County grading permit, which requires a sediment control plan and a final site plan with permanent structures to limit runoff. Some water erosion could occur during heavy storm events, but sediment controls and these surface water features would limit any runoff, so that Airport Detention Pond 2 (and hence, Fountain Creek) would not be impacted by the proposed action.

Disturbed areas would be vulnerable to wind erosion during grading and excavation of the site. Particulate matter could be transported and deposited by wind in the local area. The required permits and best management practices also contain provisions for controlling fugitive dust (see Sections 3.1.3 and 4.1.2). Deposition of particulate matter onto surface water and siltation of streams would not be significant due to the dispersive wind conditions and limited amounts of particulate matter that would be generated by the proposed action. Impacts to water quality would not be significant.

Construction of the proposed housing and improvements would increase impermeable surfaces by about 25 acres (more or less depending on final design), slightly decreasing the recharge area of the unconfined surficial aquifer and increasing storm water runoff. The proposed action would impact 25 acres of the potential recharge area of the Laramie-Fox Hills Aquifer (out of 7,000 square miles) and would negligibly impact an area of the Sand Creek Aquifer. Impacts to the aquifers would not be significant.

Storm water runoff would increase as a result of the additional 25 acres of impermeable surfaces. Storm water drainage would be installed as part of the proposed action and would drain to a separate outfall from Peterson AFB. A separate outfall would be needed due to the requirements under the base's MSGP to track discharge from industrial areas. If the housing storm water drainage flowed to the same outfall as the industrial areas (Outfall 4 at Golf Course Pond 3), the base would potentially be liable for any discharge from the privatized housing area (including oil residue or household chemicals). Low impact development (limiting storm water runoff by the use of semi-permeable materials for paving and other areas) should be incorporated to the extent possible. If feasible, some areas of storm water collection could incorporate percolation systems rather than inlets and pipes draining to an outfall.

Vehicles driving or parking on newly paved areas would slightly increase the amount of oil and grease potentially reaching surface water or aquifers. The risk of any spills reaching the storm

water drainage system or soil would be low and impacts to water quality would not be significant.

The proposed action would not impact any floodplains, as the closest floodplain is about 3,400 feet to the west. No USACE permits would be needed.

There are no wetlands on Peterson AFB; therefore, the proposed action would not impact any wetland areas.

No Action Alternative

Under the no action alternative, there would be no impact to groundwater, surface water, or floodplains, or wetlands.

Off-Base Privatized Housing Alternative

Impacts from constructing the proposed housing off-base would be similar to those of the proposed action. The amount of ground disturbed would be similar. The contractor would be required to obtain an El Paso County grading permit and implement best management practices to control erosion. Depending on the site selected, an NPDES permit could be required (if construction at the site would affect waters of the U.S.). Adequate stormwater drainage would need to be incorporated into the development, in accordance with county requirements. The potential significance of impacts would depend upon the site selected and characteristics of the developer's proposal for the off-base site, but permit requirements and best management practices would likely reduce the potential for impacts to the insignificant level.

Impacts from constructing the proposed housing off-base would be similar to or greater than those of the proposed action. The amount of ground disturbed would be greater because more new housing would be constructed (as compared to reuse and renovation of some units on-base). The contractor would be required to obtain an El Paso County grading permit and implement best management practices to control erosion. Depending on the site selected, an NPDES permit could be required (if construction at the site would affect waters of the U.S.). If floodplains or wetlands would be affected, a permit from USACE would be required. The potential significance of impacts would depend upon the site selected and characteristics of the developer's proposal for the off-base site, but permit requirements and best management practices would likely reduce the potential for impacts to the insignificant level.

4.4 Biological Resources

Proposed Action

In currently landscaped and developed areas (Parcels E-1 and E-1-A), activities during construction, renovation, and demolition would lead to short-term impacts on vegetation. The RFP states that "Existing trees shall be saved to the maximum extent possible." The Project Owner is also required to develop a Facilities Maintenance Plan that addresses grounds maintenance (individual yards, common and recreational areas), and tree and shrub maintenance

at units including vacant units (foundation plantings) and common areas (including tree trimming, dead tree/plant replacement). Peterson AFB's acceptance of this plan and the Project Owner's subsequent implementation is expected to result in no adverse impacts to vegetation maintenance in developed areas. Parcel E-1-A is expected to be returned to the Air Force after the transition period (maximum of six years) for maintenance as a semi-improved area, seeded with a grass mixture to promote ground cover, as with other semi-improved base areas.

The existing vegetation on Parcels E-2, E-3, E-4, and E-5 consists of minimally maintained grass cover. Parcels E-2, E-3, and E-4 will be replaced with surfaces consistent with a residential subdivision: turfgrass, landscape/bedding plants, ornamental shrubs, housing and related structures, and paved roads and walkways. The vegetation cover on Parcel E-5, after remediation of lead and PAH contamination (see Section 4.6), will have a similar grass cover to what is there now. Noxious weed management is required by the *Colorado Noxious Weed Act* (CRS 35-5.5), which mandates control of noxious weeds listed under the Act, with enforcement up to and including eradication by the local governing body and assessment of the associated costs to the affected landowner or occupant.

No significant impacts on vegetation resource values are predicted as a result of the proposed action, due to the non-native state of vegetation currently existing in the areas proposed for transfer.

Starting at the time of initial construction, local wildlife will tend to avoid the semi-improved parcels' human and mechanical activity, and their presence in the area will shift to adjacent and nearby less disturbed areas, such as the base golf course and the semi-improved land of the municipal airport. Since all activities will occur in previously improved and semi-improved areas, no significant adverse effects on wildlife are expected as a result of the proposed action.

No Action Alternative

Management of Peterson AFB's natural resources by the Air Force has been conducted in accordance with policies summarized in the base's *Integrated Natural Resources Management Plan* (USAF 2005c). Under the no action alternative, management of these resources would continue as in the past, and no impacts to the effective management of biological resources would occur.

Off-Base Privatized Housing Alternative

Under this alternative action, military housing would be constructed at a location not occupied by Peterson AFB. A possible location has not been identified. The potential for effects to vegetation, general wildlife, or rare, endangered, or threatened species cannot be assessed without identification of a specification location, and this remains a data gap for the analysis of this alternative in this EA.

4.5 Human Health and Safety

Proposed Action

Under the proposed action, 153 existing residential units will be demolished, 251 units will be renovated, and 383 new units will be constructed. The resulting inventory of 723 units will be maintained by the Project Owner. The net increase of 230 units (47% increase) would significantly increase the volume of traffic in and around the parcels proposed for transfer. This increase in vehicle traffic would largely be in a residential area and is not expected to be high speed. Safety risks posed by vehicle traffic can be mitigated by speed control, effective signage, pedestrian rights-of-way, and planning to limit access between housing units and major traffic arteries. Military families that would occupy the new residences are likely presented with similar vehicle safety risks at their current off-site housing locations.

New construction and renovation would provide the opportunity to remove hazardous materials of construction (including asbestos and lead-based paint), and thereby reduce the safety risks posed by these materials. An expanded residential area also introduces potential increases in human health risks associated with pesticide applications, both from landscape applications by a lawn care service contractor, and household use of pesticides by residents. Such risks are easily mitigated by education of tenants in the proper application of pesticides in accordance with published instructions. It is not anticipated that large-scale pesticide application would occur. Military families that would occupy the new residences are also likely presented with similar human health risks at their current off-site housing locations.

Due to the location of a broadband trailer and satellite farm in the southwest corner of Parcel E-2, residents near that area could be exposed to radiation associated with satellite communication. The radiation associated with satellite communication is microwave radiation (non-ionizing radiation), for which tissue damage is caused by excessive heating (as in a microwave oven). Typical exposures to radiation from satellite communications are far too low to raise tissue temperature. The permissible exposure is regulated by the Federal Communications Commission and other regulatory bodies, and limits are typically set conservatively (Health Physics Society 2003). Studies continue into the effects of exposure to low-level radiofrequency energy. Exposures can be mitigated by controlling unauthorized access to the immediate area. No health impacts are expected.

Demolition, construction, and renovation activities present a new set of safety risks. These risks include health risks due to hazardous materials to become airborne, risks associated with temporary increases in heavy equipment, and risks associated with construction zones in general (including trip and fall hazards and noise hazards). These safety risks would be short-term, ceasing to continue after demolition, construction, and renovation activities are completed. Additionally, these safety risks could be mitigated through the use of water sprays during demolition and industry standard construction protective measures (including fall protection and hearing protection).

Children are more sensitive to some environmental effects than adults, including those resulting from exposure to the hazards identified above. The removal of hazardous materials of

construction from existing housing units, including asbestos and lead-based paint, would benefit the environment for children in the residences. Implementation of measures to restrict access to demolition and construction sites may deter children from entering such areas during work and non-work hours. Finally, since noise increases would be intermittent and short in duration, special risks to children from demolition and construction noises are not anticipated.

Overall, the short-term increases in safety risk associated with construction activities would be outweighed by the long-term benefits of removal of hazardous materials. Industrial risks thought to be more damaging to children would be reduced as a whole. Increases in area traffic safety risk and exposure to non-ionizing radiation are not predicted to be significant. Other human health and safety risks common to residential areas would be similar to those likely presented at the current housing locations of prospective tenants.

Lead and PAH Remediation of Skeet Range

Under the proposed action, soils in Parcels E-3 and E-5 that are contaminated with lead and PAHs would be remediated prior to other uses. (See Section 3.6.2 for a discussion of contamination levels.) The final version of the RFP for the proposed action will specify that soils in these parcels must be remediated to residential levels.

Lead Impact Analysis. The USEPA stated “While potentially harmful to individuals of all ages, lead exposure is especially harmful to children. Their rapidly developing nervous systems are particularly sensitive to the effects of lead. In addition, children absorb a greater portion of the lead to which they are exposed than adults do. Excessive exposure to lead in children causes learning disabilities, lower intelligence, behavioral problems, growth impairment, permanent hearing and visual impairment, and other damage to the brain and nervous system.” (63 *Federal Register* 106).

As will be required by the final RFP, in this EA it has been assumed that remediation of Parcels E-3 and E-5 would achieve residential standards, that is, a soil lead contamination level less than 400 mg/kg, also stated as 400 ppm. This remediation level is consistent with the following sources:

- CDPHE *Proposed Soil Remediation Objectives Policy Document* (CDPHE 1997), listing a “Tier 2” soil remediation level of 400 mg/kg for unrestricted residential use. Tier 2 residential table values, including the groundwater protection values, would be viewed as being protective of human health and the environment. The risk-based soil levels developed under this tier were calculated for human exposures via each of the following pathways: dermal contact, soil ingestion, volatile inhalation, particulate inhalation, and leaching to groundwater. The combined health effects of each exposure pathway were considered in the calculation of a cumulative carcinogenic and non-carcinogenic soil concentration for each hazardous substance listed. Unless they are incorporated into an enforcement action, the Tier 2 table values are not enforceable standards, but rather are used by the Division and the implementing party as a guide in setting appropriate site-specific remediation goals. The source used in setting this level was the USEPA’s directive described in the following paragraph.

- USEPA’s Office of Solid Waste and Emergency Response (OSWER) Directive O9355.4-12 of July 14, 1994, “Revised Interim Soil Lead Guidance for CERCLA Site and RCRA Corrective Action Facilities,” which set 400 ppm of lead in soil in residential areas as the level at which to consider taking action (USEPA 1994). In this directive, USEPA states that “Residential areas with soil lead below 400 ppm generally require no further action. However, in some special situations, further study is warranted below the screening level. For example, agricultural areas, wetlands, areas with ecological risk, and areas of higher than expected human exposure are all situations that could require further study.” In the USEPA OSWER directive described above, the level of 400 ppm was established to limit exposure to soil lead levels such that a typical (or hypothetical) child or group of similarly exposed children would have an estimated risk of no more than 5% exceeding the 10 micrograms per deciliter ($\mu\text{g}/\text{dL}$) blood lead level. The directive states that this 10 $\mu\text{g}/\text{dL}$ blood lead level is based upon analyses conducted by the Centers for Disease Control and USEPA that associate blood lead levels of 10 $\mu\text{g}/\text{dL}$ and higher with health effects in children; however, this blood lead level is below a level that would trigger medical intervention. In developing the residential screening level, OSWER applied the USEPA’s Integrated Exposure Uptake Biokinetic (IEUBK) model on a site-specific basis. This model was designed specifically to evaluate exposures for children in a residential setting. Current research indicates that young children are particularly sensitive to the effects of lead and require specific attention in the development of a soil screening level for lead. A screening level that is protective for young children is expected to be protective for older population subgroups. The identification of lead exposures from other sources (due to air, water, diet, paint, etc.) is an essential part of characterizing the appropriate blood lead distribution for a specific neighborhood or site. For the purpose of deriving a residential screening level, the background lead exposure inputs to the IEUBK model were determined using national averages, where suitable, or typical values. Thus, the estimated screening level of 400 ppm is associated with an expected “typical” response to these exposures, and should not be taken to indicate that a certain level of risk (e.g., exactly 5% of children exceeding 10 $\mu\text{g}/\text{dL}$ blood) will be observed in specific community, e.g., in a blood lead survey. Because a child’s exposure to lead involves a complex array of variables, because there is population sampling variability, and because there is variability in environmental lead measurements and background levels of lead in food and drinking water, results from the model may differ from results of blood lead screening of children in a community.
- In 2001, USEPA published the “Identification of Dangerous Lead Levels” regulation (40 CFR 745) to establish standards for lead-based paint hazards, which, among other objectives, supports requirements for lead cleanups under State authorities. The *Federal Register* notice establishing this regulation (66 *Federal Register* 4) provided detailed discussion of the background for establishing the hazard standard of 400 ppm in bare soil in children’s’ play areas. There is no threshold level (that is, a level associated with no adverse effects) for the effects of lead on children. A blood lead level of concern was identified as 10 $\mu\text{g}/\text{dL}$, based on the use of this level as the level of concern recommended by the U.S. Centers for Disease Control and Prevention and USEPA’s cost-benefit and risk evaluations. The blood lead level of concern (10 $\mu\text{g}/\text{dL}$) is based on a significant body of scientific evidence, that shows that a number of significant health effects manifest themselves in the

10-15 µg/dL range. USEPA also stated that the evidence indicates that health effects at lower levels of exposure are less well substantiated, based on a limited number of children, and observation of subtle molecular changes that are not currently thought to be sufficiently significant to warrant national concern. USEPA stated that the soil standard of 400 ppm is associated with a 1 to 5% probability of a child developing a blood lead level of 10 µg/dL. USEPA rejected the lowest possible probability, which is zero, because, even without lead-based paint and lead contaminated soil and dust, there could be some small mathematical probability that a child could still have a blood-lead level equaling or exceeding 10 µg/dL, since other sources of exposure (air, water, diet, and background levels of lead) remain. USEPA also stated that, as a practical matter, in the context of establishing on a national level the initial candidate for the hazard level, the probabilities that given environmental levels of lead “would result” in blood lead levels of concern, 1% is not distinguishable from 5% in estimating risks from soil lead.

No significant adverse health impacts are predicted to be posed by soil that has been remediated to a level of 400 ppm lead.

PAH Impact Analysis. PAHs are a group of more than a hundred organic compounds with two or more aromatic rings. Generally, acceptable soil levels for PAHs vary according to the specific compound(s) that are present. A 2005 remedial investigation conducted by Peterson AFB reported the presence of 17 different PAHs in skeet range soil; the most commonly detected PAH was benzo(a)pyrene (USAF 2005d). As will be required by the specification of soil remediation consistent with residential use that will be specified in the final RFP, this EA assumes that Parcels E-3 and E-5 would be remediated to PAH levels that are associated with no adverse health impacts, as established in policies and standards of the State of Colorado and the USEPA. At a minimum, it is assumed that PAH contamination on Parcels E-3 and E-5 will be remediated to at least the risk-based screening levels for residential exposure to surface soils, as calculated using the Risk-Based Corrective Action Tier 1A Model (with default values) developed by the Colorado Department of Labor and Employment, Oil Inspection Section (CDLE 2005), and, if more stringent chemical-specific values have been calculated by the CDPHE, USEPA, or other oversight agency, the more stringent value would be used. These initially identified risk-based screening levels are listed in Table 10.

Table 10. Risk-Based Screening Levels for PAHs

PAH	Risk-Based Screening Level (ppm) ¹
Acenaphthene	3,000
Acenaphthylene	ND ²
Anthracene	15,000
Benzo[a]anthracene	0.41
Benzo[a]pyrene	0.041
Benzo[b]fluoranthene	0.41
Benzo[g,h,i]perylene	ND
Benzo[k]fluoranthene	4.1
Chrysene	41
Dibenz[a,h]anthracene	0.041
Fluoranthene	1,800
Fluorene	2,000
Indeno[1,2,3cd]pyrene	0.410
2-Methyl-naphthalene	ND
Naphthalene	289.1 ³
Phenanthrene	ND
Pyrene	1,500

¹Source: CDLE 2005, unless otherwise stated.

²ND = no data.

³Source: residential “Tier 2” soil remediation level in the CDPHE *Proposed Soil Remediation Objectives Policy Document* (CDPHE 1997), a tenfold stricter value than the CDLE (2005) level of 2,000 ppm.

No significant adverse health impacts are predicted to be posed by soil that has been remediated to an acceptable residential soil standard for each PAH compound that is present.

No Action Alternative

Under the no action alternative, no changes from current health hazards and safety risks would be realized. Hazardous materials, such as asbestos and lead-based paint, would remain in many housing units. Traffic volumes would not appreciably change from current levels. Safety risks from a long-term renovation campaign would remain.

Off-Base Privatized Housing Alternative

Under this alternative action, military housing would be constructed at a location not occupied by Peterson AFB. A potential location has not been identified, but is expected to be a currently undeveloped parcel. The actions to be performed under this alternative are predicted to raise the same set of human health and safety issues as those posed by the proposed action, with the exception of the lead and PAH soil remediation associated with residential development of the Peterson AFB skeet range. Construction-related risks are expected to be short-term. Other human health and safety risks common to residential areas (such as increased traffic and pesticide usage) would be similar to those likely presented at the current housing locations of prospective tenants.

4.6 Solid Waste and Hazardous Materials

The analysis was based on a review of potential issues with solid wastes and hazardous materials and wastes. The analysis focused on the types of proposed activities and where they would occur. The analysis looked at the mechanisms of potential spills or leaks, the likelihood of a dispersion of hazardous material, and the severity of consequences that could occur.

Proposed Action

Under the proposed action, 153 existing residential units will be demolished, 251 units will be renovated, and 383 new units will be constructed. The resulting inventory of 723 units will be maintained by the MHPI privatization contractor. There will be a short-term increase in solid waste generation due to generation of waste materials during demolition, renovation, and construction activities. This will be followed by a long-term increase (estimated at approximately 50%) in recurring solid waste generation by the occupants of the 383 new units to be constructed. The MHPI privatization contractor will be responsible for disposal of solid waste generated from the proposed action, using either the Colorado Springs landfill or privately owned landfills. The military families who will occupy these housing units presently reside in the general area served by the same landfills, so no overall increase in long-term solid waste generation in the Colorado Springs area would occur, nor would there be any new long-term impacts on local landfill capacity.

Solid waste generation amounts can be estimated using empirical data. Based on documented sampling studies (Franklin Associates 1998), approximately 4.38 pounds per square foot (lb/ft²) and 77.6 lbs/ft² of solid waste would be generated during residential construction and demolition, respectively. Tables 11 and 12 provide estimates for solid waste generation during demolition and construction activities. As the number of new units to be constructed is not known by type, a similar percentage of total units is assumed as for units to be demolished.

Table 11. Solid Waste Generation from Demolition Activities

Unit Type	Number of Units	Percentage of Total	Average Size [ft ²]	Solid Waste Generated [ton] ^a
JNCO Units – I	105	68.6%	1,400	5,704
SNCO Units	14	9.2%	1,490	809
CGO Units	23	15.0%	1,490	1,330
Senior Officer	5	3.3%	1,930	374
General Officer	6	3.9%	2,900	675
TOTAL	153			8,892

^aCalculation based on average solid waste generated (77.6 lb/ft²) during demolition.

Table 12. Solid Waste Generation from Construction Activities

Unit Type	Percentage of Total	Number of Units	Average Size [ft ²]	Solid Waste Generated [ton] ^b
JNCO Units – I	68.6%	263	1,400	806
SNCO Units	9.2%	35	1,490	114
CGO Units	15.0%	57	1,490	186
Senior Officer	3.3%	13	1,930	55
General Officer	3.9%	15	2,900	95
TOTAL		383		1,256

^b Calculation based on average solid waste generated (4.38 lb/ft²) during construction.

The demolition of 153 units and the construction of 383 units are expected to generate approximately 10,150 tons of solid waste. Common practices such as deconstruction, recycling, and salvage can reduce the total amount of solid waste destined for landfill disposal in addition to resulting in significant cost savings.

In addition to demolition and construction activities, 251 units are planned for renovation. Appropriate unit-based estimates for renovation activities could not be located, but solid waste generation from these activities is expected to be similar (although higher) to that for new construction. However, total solid waste generation estimates for the proposed action are dominated by demolition activities.

Fuels and lubricants would be used for equipment during excavation, grading, and construction of housing units within the proposed action site. Other hazardous materials (such as paints, thinners, and sealants) may be used during the construction/renovation activities, but must be controlled under standard safety and handling procedures. Standard safety procedures will be implemented (e.g., no smoking while fueling equipment). Overall, construction/renovation activities would minimally change the short-term usage of hazardous materials.

Demolition and renovation activities will result in a short-term increase in hazardous waste generation. Existing residential units have been identified as containing ACMs, lead-based paint, and potentially PCBs. Underground utilities may be encountered that may also contain ACMs. Soil remediation in Parcels E-3 and E-5 will generate lead-contaminated wastes (see next paragraph). Additionally, as required by the most recent draft of the RFP, the MHPI contractor will need to take all necessary measures consistent with the Air Force Radon Assessment and Mitigation Program to ensure that levels of radon within all housing units are lower than the Air Force action level of 4 pCi/L and, in all new construction, implement prudent radon reduction measures consistent with the latest building practices in the local area.

In the *Draft Remedial Investigation Report for the Trap and Skeet Range* (USAF 2005d), a cost estimate was provided for remediation activities. This estimate assumed *ex situ* solidification/stabilization as the treatment method for contaminated soils characterized as hazardous waste. Treatment of these soils would be conducted on-site, and all disposed soils would be characterized as bulk, solid, non-hazardous wastes and would be disposed of at local

commercial RCRA-regulated landfills (Subtitle D). As the current draft of the RFP does not stipulate the technologies to be used in remediation of soils, these estimates should be viewed as approximations that may increase or decrease depending upon the ultimate remediation technology selected. Estimated waste volumes resulting from soil remediation are as follows:

- Lead-contaminated soils not requiring treatment: 46,630 cubic yards
- Lead-contaminated soils requiring treatment: 6,044 cubic yards
- PAH-contaminated soils not requiring treatment: 24,935 cubic yards
- PAH-contaminated soils requiring treatment: 11,150 cubic yards
- Total contaminated soils disposed: 88,759 cubic yards

In 2002 to 2004, the Colorado Springs landfill received annual amounts of solid waste ranging from 540,771 to 680,285 cubic yards of solid waste annually (CDPHE 2006b). The estimated amount of soil that will require disposal is within this recent variation in annual solid waste received, and therefore is not expected to significantly impact local landfill operations.

Overall, the proposed action would be associated with a short-term increase in solid waste generation from demolition, renovation, construction, and remediation activities, followed by a long-term localized increase in generation of municipal-type solid waste from residential occupation of the new housing units; this increase would be offset by dispersed localized decreases in the areas where Peterson AFB families currently reside off-base, resulting in no net change to municipal solid waste generation in the Colorado Springs area. A short-term increase in hazardous waste generation would also occur during the demolition/renovation/construction phase, but would not have any significant environmental impact.

No Action Alternative

Under the no action alternative, there would be no generation of solid waste and hazardous materials from demolition, renovation, or construction, and no additional solid waste generation due to expanded residential housing use. Peterson AFB military families would continue to utilize current housing, contributing a comparable amount of household waste to the Colorado Springs-area solid waste disposal facilities as if they were all housed at Peterson AFB. Additionally, remediation of soils in Parcels E-3 and E-5 and removal of hazardous materials of construction in existing housing units may not occur, or would not occur as quickly as would otherwise occur under the proposed action.

Off-Base Privatized Housing Alternative

Under this alternative action, new military housing would be constructed at a location not occupied by Peterson AFB. A potential location has not been identified, but would be expected to be similar in nature to the undeveloped Peterson AFB parcels identified for transfer under the proposed action. Solid and hazardous waste generation would be similar to that expected for the proposed action, with only the location differing, depending on the contractor's proposal regarding how many, if any, of the current units would be demolished and renovated, and how much off-base new construction would be planned. However, remediation of soils in Parcels E-3

and E-5 and removal of hazardous materials of construction in existing housing units may not occur, or would not occur quickly as would otherwise occur in the proposed action.

4.7 Noise

Proposed Action

Under the proposed action, 153 existing residential units will be demolished, 251 units will be renovated, and 383 new units will be constructed. The resulting inventory of 723 units will be maintained by the MHPI privatization contractor. The net increase of 230 units (47% increase) would significantly increase the volume of traffic in and around the housing areas. Services currently provided to the existing residential community (such as solid waste disposal, school bus) would be expanded into the newly constructed residential areas and would also increase area noise. While the additional noise would not differ from that currently experienced in Parcels E-1 and E-1-A, noise would increase in the Peterson AFB area.

During construction activities, noise would increase due to operation of heavy equipment, increases in traffic from waste hauling activities, and other construction-related sources. These noises would be short-term, ceasing to continue after construction activities are completed. Additionally, construction activities could be scheduled to limit these noises to daylight hours, and noise mitigation measures could be implemented.

Overall, noise would increase in the proposed action's area. However, these noise increases are not anticipated to cause disruption to current area occupants or activities, nor are they anticipated to present any human health risks. Construction-related noises would be short-term and can be minimized and/or mitigated. Traffic noises would not significantly differ from those at housing locations currently occupied by prospective tenants.

The 65-dBA noise contour for Colorado Springs Municipal Airport's L_{dn} indicates that areas exist in the parcels proposed for privatization that would generally not be considered compatible with residential or institutional land uses, but would be compatible with some types of recreational uses (as well as commercial, industrial, or agricultural uses). These areas include the southern portion of Parcel E-4, the southeastern portion of Parcel E-3, and the majority of Parcel E-5. The extreme southeastern portion of Parcel E-5 is located very near the 70-dBA contour boundary. Although there are no regulations prohibiting residential use of such areas, residential construction will require incorporation of noise mitigation measures and potential cooperating efforts with the Colorado Springs Municipal Airport. The latest version of the Air Force's RFP for housing privatization states that "housing units in Parcels E-1 through E-4 are susceptible to aircraft noise and shall be constructed with sound reduction materials to attenuate aircraft noise levels inside the housing, as required by applicable standards and city codes." The Colorado Springs Municipal Airport noise contours with respect to the housing parcels are shown in Figure 5 (COS 2005). Adequate mitigation, as required by the RFP, should result in no significant noise impacts to residents from the proposed action.

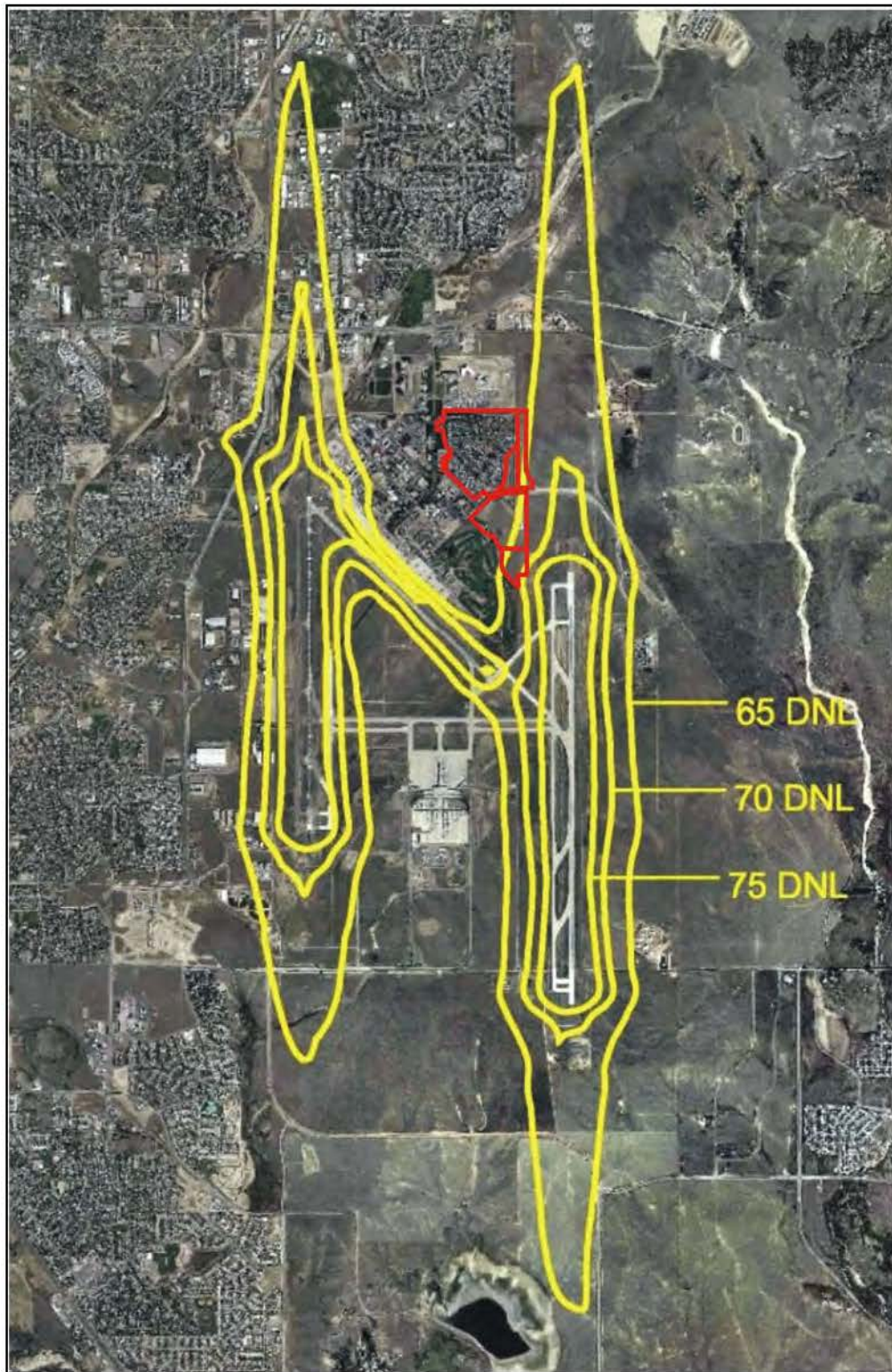


Figure 5. Colorado Springs Municipal Airport Noise Contours

No Action Alternative

Under the no action alternative, no changes from current noise levels would be realized. Noises would continue to be created by area traffic, residential use, neighboring aircraft operations, and isolated ancillary activity. While some noise associated with renovation may still be realized under this alternative, the activities would be conducted less frequently than under the proposed action.

Off-Base Privatized Housing Alternative

Under this alternative action, military housing would be constructed at a location not occupied by Peterson AFB. The proposed location has not been identified, but the location is expected to be similar in nature to the undeveloped Peterson AFB parcels identified for transfer under the proposed action. The same increases in noise would be realized under this alternative, with only the location differing. Such noise increases are not anticipated to cause disruption to area occupants or activities, nor are they anticipated to present any human health risks. Construction-related noises would be short-term and can be minimized and/or mitigated. Traffic noises would not significantly differ from those at other housing locations currently occupied by prospective tenants. Noises associated with aircraft operations could be reduced from those associated with the proposed action by locating off-base privatized housing a greater distance from the Colorado Springs Municipal Airport.

4.8 Cultural Resources

Proposed Action

The U.S. Air Force is required to comply with existing legislation to ensure that properties that may qualify for inclusion on the NRHP are not inadvertently transferred, sold, demolished, substantially altered, or allowed to deteriorate significantly. The proposed action would disturb up to 200 acres in Parcels E-1, E-1A, E-2, E-3, and E-4 for construction and demolition of housing. Excavations could reach a depth as great as 10 feet. Up to 17 acres would be disturbed when relocating the base golf driving range to Parcel E-5. An isolated artifact (a small side-notched projectile point) and a historic site (soil conservation ditches) were located within Parcel E-4. Neither of these findings were eligible for the NRHP. There were formerly WWII temporary buildings in much of Parcel E-1 and E-1A. These structures were likely to have demolished prior to construction of the existing housing; they did not appear on maps generated after the late 1960s to mid 1970s. It is possible that a few remnants of foundations from these buildings are buried below ground level in the housing area. No other archeological or historic resources are known to exist in the other parcels impacted by the proposed action. As discussed in Section 3.8, the possibility of finding more artifacts or historic sites on Peterson AFB is low and most of the area impacted by the proposed action has been previously disturbed. If any artifacts would be found, the developer would need to follow the procedures of Section 106 of the NHPA and other applicable regulations, including consultation with the State Historic Preservation Office (SHPO), as required. Therefore, no significant impacts to cultural resources are expected as a result of the proposed action.

No Action Alternative

Under the no action alternative, there would be no housing construction or demolition at Peterson AFB in the absence of current plans to conduct any such activities; therefore no impacts to cultural resources would occur.

Off-Base Privatized Housing Alternative

Under this alternative action, military housing would be constructed at a location not occupied by Peterson AFB. A potential location has not been identified. If any artifacts would be found, the developer would need to follow the procedures of Section 106 of the NHPA and other applicable regulations, including consultation with the SHPO, as required. Evaluation of potential impacts to specific cultural resources is not possible without identification of a specific site, and this remains a data gap for this EA.

4.9 Land Use

Proposed Action

Under the proposed action, 89 existing family housing units would be reused as is, 251 units would be renovated and reused, 146 existing units would be demolished, and 383 new family units would be constructed in an area of 199 acres (118 acres of existing military housing land use and 81 acres of existing industrial, outdoor recreation, and undeveloped land). One acre (Parcel E-1-A) would be converted from housing to open space when 7 units are demolished. This space would be used for the Child Development Center and Youth Center to more fully comply with force protection standards. The proposed action would increase the land used for military housing from 118 acres to 199 acres. The land utilized at Peterson AFB for outdoor recreation would decline from 270 acres to about 226 acres. Industrial acreage would decline by about 8 acres, and about 29 acres of vacant and undeveloped land would be converted to military housing. The 81-acre increase in family housing land use represents about 6.3% of the base's land. Additional infrastructure, such as roads, parking, utilities, and community support facilities, would be required. These proposed changes are currently within the land use planning component of the base's General Plan, and are not considered to be a significant effect.

No Action Alternative

Under the no action alternative, there would be no changes to land use, in the absence of current plans to conduct any construction, renovation, or demolition activities. Residential housing would continue to exist in the same areas as at present.

Off-Base Privatized Housing Alternative

Under this alternative action, military housing would be constructed at a location not occupied by Peterson AFB. A potential location has not been identified, but the location is expected to be fairly close to the base and would likely consist of undeveloped land. There are undeveloped areas to the east of the base which could potentially be developed for military housing. Areas to

the north and west of the base are already developed, and Colorado Springs Municipal Airport is to the south of the base. The potential impact on regional land use from constructing up to 723 housing units would not be negligible, but this is not likely to be a significant adverse effect on local land use, as local housing developers are actively advertising new construction for private residential development unrelated to Peterson AFB's MHPI plans in a rapidly growing urban area. Depending on where an off-site housing developed would be constructed, a change in land use zoning might be required.

Developing the planned housing off-site would free up to 200 acres on Peterson AFB for other land use, such as mission facilities, mission support (including industrial uses), outdoor recreation, open space, or community development (commercial or services).

4.10 Traffic and Transportation

Proposed Action

Under the proposed action, 153 existing residential units will be demolished, 251 units will be renovated, and 383 new units will be constructed. The resulting inventory of 723 units will be maintained by the MHPI privatization contractor. The net addition of 383 units would significantly increase the volume of traffic in the housing areas. Not only would personal vehicle traffic increase, but traffic from support services (such as solid waste disposal, school bus) would also be introduced into the area.

While traffic in the expanded residential community would increase, traffic on local roads outside the base would potentially decrease as a result of the proposed action. Fewer Peterson AFB personnel would commute daily from other areas, easing congestion on U.S. Highway 24. El Paso County officials have anticipated a potential need to expand the transportation infrastructure in the area in response to predicted growth (EPCDOT 2004), which would also alleviate local off-base traffic congestion apart from the proposed action if the County's proposed road projects are implemented.

During construction, localized increases in traffic volumes may also occur. These increases would be dominated by construction and heavy equipment traffic. These volume increases would be short-term, ceasing after construction activities are completed. Additionally, construction activities could be scheduled to time these traffic volume increases to daylight hours and away from morning and afternoon rush hours.

Overall, traffic in the immediate area would increase, but this increase would generally be a shift in traffic from one area to another and offset by a resulting decrease in other areas. Traffic increases in the immediate area are not expected to pose an unrealistic increase in hazards, and new hazards posed can be minimized and/or mitigated.

No Action Alternative

Under the no action alternative, no changes from the current traffic volumes would be realized. While some traffic volume increases associated with renovation may still be realized under this alternative, the activities would be conducted less frequently than under the proposed action.

Off-Base Privatized Housing Alternative

Under this alternative action, military housing would be constructed at a location not occupied by Peterson AFB. A potential location has not been identified. The same increases in traffic volumes predicted under the proposed action would occur under this alternative. Not only would personal vehicle traffic increase, but support services (such as solid waste disposal, school bus) would also be introduced into the area. Construction-related traffic would also increase in the short-term.

Since an off-base location has not been identified, the potential for changes in traffic volumes on local roads due to the resulting commute distances cannot be predicted. However, traffic volumes on local roads in the immediate Peterson AFB area would not be expected to decrease.

Overall, traffic in the immediate area would increase, but this increase would generally be a shift in traffic from one area to another and offset by a resulting decrease in traffic in other areas where military families currently reside. Traffic increases in the immediate area are not expected to pose an unrealistic increase in hazards, and new hazards posed can be minimized and/or mitigated.

4.11 Socioeconomics and Environmental Justice

Proposed Action

During the transition period of the proposed action (maximum of six years), new jobs will be created to directly accomplish construction activities, and indirectly as a result of purchasing goods and services needed for construction and consuming goods and services made possible by wage and salary expenditures of direct workers. Overall, there would be a short-term beneficial impact to the local economy. The proposed presence of 230 new family residences at Peterson AFB represents a beneficial impact on the local housing supply.

Under the proposed action, it is estimated that public school enrollment in Colorado Springs District #11 from Peterson AFB families could increase from the current 268 students by as many as 345 students, using a general ratio of 1.5 school-age dependents per family housing unit, for each of the 230 new units. A lower number is estimated when basing projections on the current ratio (268 students from 493 housing units, or 0.54 school-age dependents per unit), for an estimated increase of 125 students. These estimates represent an increase of 3.5 to 9.7% in total enrollment in the four district schools that serve the Peterson AFB location. The largest proportion of these students (more than 65% currently) are elementary school students. With the new elementary school (located less than a mile from the base's north gate) slated to open in August 2007, the school district has stated that they can accommodate the elementary school

student population from more than the proposed total number of Peterson AFB family housing units (723 units). Concurrent increases in middle school (Russell and Emerson-Edison) and high school (Mitchell) enrollment are projected to be 50 to 138 new middle school students and 60 to 165 new high school students. These increases would occur gradually, likely over a several-year period, as new construction is completed and families begin moving in to the new units. Federal impact aid would be provided to the school district to allow the district to meet the needs of all students residing on Peterson AFB; therefore, no significant impacts on public schools are expected.

Impacts to environmental justice would be considered significant if impacts to children, minority populations, or low-income communities due to the proposed action were disproportionately high and adverse. Because (1) all proposed activities would take place on base, (2) the potential for lead exposure to children from establishing residential housing on the former skeet range area would be fully mitigated by remediation prior to construction, and (3) no adverse impacts to the local school district are predicted, there would not be any disproportionate impacts to minorities or children. Since no significant environmental impacts are projected from the proposed action, no disproportionate impacts to any sub-populations would occur, and therefore, no environmental justice concerns have been identified.

No Action Alternative

There would be no currently planned activities affecting local employment and income, housing, school enrollment, or environmental justice under the no action alternative.

Off-Base Privatized Housing Alternative

Under this alternative action, military housing would be constructed at a location not occupied by Peterson AFB. A potential location has not been identified, but is assumed to also be within the boundaries of Colorado Springs School District #11. Effects on employment and income, housing, public school enrollment, and environmental justice would be expected to be similar to those posed by the proposed action, and would not represent any significant adverse impacts.

4.12 Cumulative Impacts

Cumulative impacts are those changes to the physical and biological environments that would result from the proposed action in combination with reasonably foreseeable future actions. Significant cumulative impacts could result from impacts that are not significant individually, but when considered together, are collectively significant.

There are several major projects planned for Peterson AFB over the next few years. Improvements are planned at all three gates, Stewart Avenue will be widened and a new bridge constructed over East Fork Sand Creek, Paine Street is to be extended, and several facilities are planned for Peterson East. Additionally, redevelopment of the Triangle Area is planned, and building additions are planned in the Command Area.

The proposed action shall comply with Federal and Colorado air quality laws and Air Force policies that are designed to minimize long-term cumulative impacts to air quality. Short-term construction emissions from the proposed action and other planned actions in the next several years would not violate state or Federal standards. Many of the planned actions would require an APEN for ground disturbance. The mandatory controls would limit particulate matter emissions to minimal levels. Other criteria pollutants would be generated by operation of construction equipment, but these emissions would be intermittent over a long period of time and would be dispersed by winds. Emissions of all criteria pollutants in the metropolitan area are well below the standards (PPACG 2004), with the exception of ozone, which is being generated at about 85% of the standard (CDPHE 2006a).

Increases in long-term emissions from new stationary sources installed for the proposed housing (residential furnaces and water heaters) would be minimal (about 0.3 tons per year of CO and about 0.6 tons per year of NO_x) (see Section 4.1). The emissions generated by increased combustion of natural gas by stationary sources from the proposed housing would not substantially contribute to total emissions generated at Peterson AFB. The proposed action would conform with the Colorado Springs maintenance plan for CO. Long-term emissions from other planned actions would increase emissions at the base from additional stationary sources, such as backup generators and boilers. The emissions from these additional sources will be quantified in a Base General Plan EA in the near future. Peterson AFB is not yet subject to PSD requirements but would likely approach these thresholds in the next few years. The proposed housing would not substantially contribute to increases toward this threshold.

The proposed housing would not substantially increase emissions in the Colorado Springs maintenance area for CO. Most of the people who would move to the proposed housing are already living in the CO maintenance area and net emissions would likely decrease with shorter commutes to work and lower stationary source emissions from living in newer, more efficient housing. Cumulative impacts to air quality would not be significant.

Impacts to soils from the proposed action and other ongoing and planned actions over the next seven years (from potential erosion) would be limited by permit requirements and would not be significant. Impacts to surface water would also be limited by permit requirements and would not be significant. Impacts to groundwater would be minimal.

All activities at Peterson AFB affecting natural resources are managed in accordance with the *Integrated Natural Resources Management Plan* and applicable regulations, and any impacts from the proposed action and other activities would have limited effects to vegetation and wildlife species. None of these impacts would be significant.

Only minor impacts to human health and safety, solid waste and hazardous materials, noise, cultural resources, and land use from the proposed action were identified. Impacts to these resource areas would not substantially contribute to ongoing and future impacts at Peterson AFB or in the local area.

No significant adverse socioeconomic impacts or impacts to traffic were identified for the MHPI project at Peterson AFB. However, this MHPI project would occur within the context of larger

changes in the community of military families based in the Colorado Springs area. The greatest of these changes is an influx of up to 10,000 soldiers (up to a 58% increase over current numbers) to Fort Carson as a result of Defense Base Realignment and Closure Commission (BRAC) decisions in 2005. Schriever AFB plans to construct military housing for 269 families, and USAFA plans to decrease its housing supply from the current 1,208 units to 427 units. The effects of the MHPI at Schriever, USAFA, and Peterson, combined with the foreseeable influx of military families due to BRAC, may have impacts on the use of local infrastructure as well as the economic development of certain target areas. However, as the increased number of housing units at Peterson AFB will accommodate military families already located in the area but currently living off-base, the contribution of the Peterson AFB MHPI to any potential cumulative impact on local infrastructure and services is expected to be negligible.

Given the lack of significant environmental impacts overall (and, therefore, a lack of any disproportionate impacts to minorities), there would not be any significant cumulative impacts to environmental justice.

Any future Federal actions that may have potentially significant impacts to the environment would be assessed in separate NEPA documents.

SECTION 5. AGENCIES CONTACTED

Sources for this EA included the documents and electronic resources listed in Section 7, and Peterson AFB personnel, including the following:

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APPENDIX A

ACRONYMS, ABBREVIATIONS, AND DEFINITION OF TERMS

ACRONYMS AND ABBREVIATIONS

µg/dL	micrograms per deciliter
ACM	asbestos-containing material
AFB	Air Force base
AFI	Air Force Instruction
AFT	asbestos floor tiling
APEN	Air Pollutant Emissions Notice
AQCR	Air Quality Control Region
AST	aboveground storage tank
BRAC	Base Realignment and Closure
CAA	<i>Clean Air Act</i>
CCR	Colorado Code of Regulations
CDPHE	Colorado Department of Public Health and Environment
CEQ	Council on Environmental Quality
CERCLA	<i>Comprehensive Environmental Response, Compensation, and Liability Act</i>
CFR	Code of Federal Regulations
CNHP	Colorado Natural Heritage Program
CO	carbon monoxide; Colorado
dBA	A-weighted decibel
EA	environmental assessment
EBS	environmental baseline survey
EPCDOT	El Paso County Department of Transportation
DoD	Department of Defense
FAA	Federal Aviation Administration
FONSI	finding of no significant impact
FTE	full-time equivalent
HAP	hazardous air pollutant
HRMA	Housing Requirements and Market Analysis
IEUBK	Integrated Exposure Uptake Biokinetic Model
IRP	Installation Restoration Program
lb/ft ²	pounds per square foot
L _{dn}	day-night average sound level
LUST	leaking underground storage tank
MHPI	Military Housing Privatization Initiative
mg/kg	milligrams per kilogram
mg/L	milligrams per liter
MSA	metropolitan statistical area
MSGP	Multi-Sector General Permit
NAAQS	national ambient air quality standard
NEPA	<i>National Environmental Policy Act</i>
NESHAP	National Emission Standards for Hazardous Air Pollutants
NHPA	<i>National Historic Preservation Act</i>
NO _x	nitrogen oxides
NPDES	National Pollutant Discharge Elimination System
NRHP	National Register of Historic Places

OSWER	Office of Solid Waste and Emergency Response
PAH	polycyclic aromatic hydrocarbon
PCBs	polychlorinated biphenyls
pCi/L	picocuries per liter
PM _{2.5}	particulate matter less than 2.4 microns in diameter
PM ₁₀	particulate matter less than 10 microns in diameter
ppm	parts per million
PSD	Prevention of Significant Deterioration
RCRA	<i>Resource Conservation and Recovery Act</i>
RFP	request for proposals
SHPO	State Historic Preservation Office
SIP	state implementation plan
SO _x	sulfur oxides
SWPP	storm water pollution prevention plan
USACE	U.S. Army Corps of Engineers
USAF	U.S. Air Force
USAFA	U.S. Air Force Academy
USEPA	U.S. Environmental Protection Agency
USGS	U.S. Geological Survey
UST	underground storage tank
VOC	volatile organic carbon compound
WWII	World War II

DEFINITION OF TERMS

Aquifer. The water-bearing portion of subsurface earth material that yields or is capable of yielding useful quantities of water to wells.

Asbestos. A carcinogenic substance formerly used widely as an insulation material by the construction industry, often found in older buildings.

Cultural resources. Remains of human activity, occupation, or endeavor, reflected in districts, sites, structures, building, objects, artifacts, ruins, works of art, architecture, and natural features that were of importance in past human events. Cultural resources consist of (1) physical remains, (2) areas where significant human events occurred, even though evidence of the events no longer remains, and (3) the environment immediately surrounding the actual resource.

Cumulative impact. The impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time

Endangered species. Plant or animal species that are in danger of extinction throughout all or a significant part of their range.

Environmental assessment. A systematic environmental analysis of site-specific activities used to determine whether such activities would significantly affect the human environment, and whether an environmental impact statement is required.

Environmental baseline survey. An EBS is prepared for any property to be transferred, purchased, or leased. An EBS is based on all existing environmental information related to storage, release, treatment, or disposal of hazardous substances or petroleum products on the property to determine or discover the obviousness of the presence or likely presence of a release or threatened release of any hazardous substance or petroleum product.

Environmental impact statement. An analytical document developed for use by decisionmakers to weigh the environmental consequences of a potential action.

Erosion. Wearing away of soil and rock by weathering and the action of streams, wind, and underground water.

Groundwater. Water within the earth that supplies wells and springs.

Habitat. The environment in which an organism occurs.

Hazardous Substance. A substance defined as a hazardous substance pursuant to CERCLA 42 U.S.C. Sec. 9601(14), as interpreted by USEPA regulations and the courts.

Hazardous Waste. Any hazardous waste having the characteristics identified under or listed pursuant to Section 3001 of the *Solid Waste Disposal Act* (42 U.S.C. Sec. 6921) (but not including any waste the regulation of which under the *Solid Waste Disposal Act* (42 U.S.C. Sec. 6901, et. seq.) has been suspended by Act of Congress). The *Solid Waste Disposal Act* of 1980 amended the *Resource Conservation and Recovery Act* (RCRA). RCRA defines a hazardous waste in 42 U.S.C. Sec. 6903 as “a solid waste, or combination of solid wastes, which because of its quantity, concentration, or physical, chemical, or infectious characteristics may (a) cause, or significantly contribute to an increase in mortality or an increase in serious irreversible, or incapacitation reversible, illness; or (b) pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, or disposed of, or otherwise managed.”

Intermittent stream. A stream that flows only at certain times of the year when it receives water from winter rain or melting snow.

Military Housing Privatization Initiative. A program to allow private sector financing, ownership, operation, and maintenance of military housing. Under the program, which was initially authorized in 1996 under the *National Defense Authorization Act* and was reauthorized in 2001 for an additional five years, DoD can provide direct loans, loan guarantees, and other incentives to encourage private developers to construct and operate housing either on or off military installations.

National Environmental Policy Act. Federal legislation enacted in 1969 that requires Federal agencies to consider environmental impacts in their decision-making process.

Noxious weed. According to the *Federal Noxious Weed Act* (FL 93-629), a weed that causes disease or has other adverse effects on man or his environment and therefore is detrimental to the agriculture and commerce of the United States and to the public health.

Perennial stream. A stream that flows continuously year round.

Project Owner. The private developer who would be contracted by the Air Force to implement the Military Housing Privatization Initiative at Peterson AFB.

Runoff. The part of the precipitation in a drainage area that is discharged from the area in stream channels, including surface runoff, ground water runoff, and seepage.

Threatened species. A plant or animal species that is not in danger of extinction but is likely to become so within the foreseeable future throughout all or a significant portion of its range.

Toxic Substances Control Act. This law was enacted in 1976 to give the USEPA the ability to track industrial chemicals currently produced or imported into the United States. The USEPA repeatedly screens these chemicals and can require reporting or testing of those that may pose an environmental or human health hazard, or can ban the manufacture and import of those chemicals that pose an unreasonable risk.

Underground Storage Tank (UST). Any tank, including underground piping connected to the tank, which is or has been used to contain hazardous substances or petroleum products and the volume of which is ten percent or more beneath the surface of the ground.

APPENDIX B

AIR EMISSIONS ESTIMATES FROM THE PROPOSED ACTION

Estimated Air Emissions from Proposed Construction and Operation Activities

This appendix presents calculations performed for estimating air emissions generated from activities related to the construction and operation of housing units at Peterson AFB.

Table B-1. Construction Emissions Summary ¹

		Emissions (tons)						
		CO	VOC	NO _x	SO _x	PM ₁₀	PM _{2.5}	HAPs
Construction Non-Road Emissions								
Grading (fugitive dust)						2.75	0.38	
Trucks - paved roads						0.12	0.03	
Trucks - unpaved roads						1.47	0.23	
Construction Equipment		3.77	0.85	12.03	2.63	0.02	0.51	0.25
Asphalt plant (off site)		2.16	0.04	0.14	0.02	0.15		0.000341
Subtotal	tons	5.93	0.90	12.16	2.66	4.50	1.15	0.25
	lbs	11853	1794	24323	5315	9003	2296	509
	tons/year	1.98	0.30	4.05	0.89	1.50	0.38	0.08
	lbs/year	3951.09	597.94	8107.81	1771.75	3000.88	765.33	169.79
	tons/day avg	0.00790	0.00120	0.01622	0.00354	0.00600	0.00153	0.00034
	lbs/day avg	15.8	2.4	32.4	7.1	12.0	3.1	0.7
Worker Vehicles								
	tons	1.90	0.11	0.13	0.01	0.002		
	lbs	3791	223	260	27	4		
	tons/yr	0.6319	0.0372	0.0434	0.0045	0.0007		
	lbs/yr	1263.77	74.34	86.73	8.92	1.36		
	tons/day avg	0.0025275	0.0001487	0.0001735	0.0000178	0.0000027		
	lbs/day avg	5.0551	0.2974	0.3469	0.0357	0.0055		
Total Emissions								
	tons	7.82	1.01	12.29	2.67	4.50	1.15	0.25
	lbs	15645	2017	24584	5342	9007	2296	509
	tons/yr	2.61	0.34	4.10	0.89	1.50	0.38	0.08
	lbs/yr	5214.85	672.28	8194.54	1780.67	3002.25	765.33	169.79
	tons/day avg	0.0104	0.0013	0.0164	0.0036	0.0060	0.0015	0.0003
	lbs/day avg	20.9	2.7	32.8	7.1	12.0	3.1	0.7

¹ See Tables B-3 through B-10 for emissions estimate calculations.

Table B-2. Housing Units (Stationary Sources) Operation Emissions Summary ¹

Source	Emissions (tons/year)					
	CO	VOCs	NO _x	SO _x	PM ₁₀	HAPs
Natural gas consumption	0.28	0.04	0.65	0.00	0.05	0.013

¹ See Tables B-11 and B-12 for emissions estimate calculations.

Table B-3. PM Emissions from Grading (fugitive dust)

Calculation	Result
PM emission rate = $\frac{1.0*s^{1.5}}{M^{1.4}}$ lb/hr ¹	6.103 lb/hr PM
where s = silt (%), M = moisture (%) ^{2,3}	
PM ₁₀ = PM * 0.75	4.58 lbs/hr PM ₁₀
PM _{2.5} = PM * 0.105	0.64 lbs/hr PM _{2.5}
Remainder of PM is greater than 10 microns	
Total grading hours = 1,200 hours ⁴	5493.1 lbs PM ₁₀ 769.04 lbs PM _{2.5}
Total grading emissions (tons) =	2.75 tons PM ₁₀ 0.38 tons PM _{2.5}

¹ Sources: USEPA 1995, USEPA 1998

² Silt content is about 15% for the affected soil type (USDA 2004).

³ 5% soil moisture was assumed.

⁴ assumes typical residential development with minimal topographic change, about 3/4 day per acre

Table B-4. PM Emissions from Trucks Driving on Paved Roads

Equation	$EF = k(sL/2)^{0.65} (W/3)^{1.5}$ where: EF = emission factor for normal conditions k = particle size multiplier for PM ₁₀ (0.016) or PM _{2.5} (0.004) sL = silt loading (g/m ²); default value for normal conditions, low ADT roads W = mean vehicle weight (tons); assumed to be 10
PM ₁₀ emission factor	0.034 lb/mile
PM _{2.5} emission factor	0.009 lb/mile

Additional assumptions:

10 miles/round trip

6 trucks/hour

8 hours of activity

15 days

Yield:

7200 Total vehicle miles travelled

246.29 Total PM₁₀ emissions (lbs)0.123 Total PM₁₀ emissions (tons)61.572 Total PM_{2.5} emissions (lbs)0.031 Total PM_{2.5} emissions (tons)

¹ Emission factor formula from USEPA 2003a.

Table B-5. PM Emissions from Trucks Driving on Unpaved Roads

Equation¹: $EF = k(s/12)^a(W/3)^b$
where:
EF = emission factor on unpaved roads (uncontrolled)
k = particle size multiplier for PM₁₀ (1.5) or PM_{2.5} (0.23)
s = silt (%); assumed to be 20%
W = mean vehicle weight (tons); assumed to be 15
a and b are empirical constants; a = 0.9 and b = 0.45

PM ₁₀ emission factor	4.084 lb/mile
PM _{2.5} emission factor	0.626 lb/mile

Additional assumptions:

1 Mile/round trip
6 Trucks/hour
8 Hours of activity
15 Days

Yield:

720 Total vehicle miles travelled

2940.24192 Total PM₁₀ emissions (lbs)

1.47 Total PM₁₀ emissions (tons)

450.837095 Total PM_{2.5} emissions (lbs)

0.225 Total PM_{2.5} emissions (tons)

¹ Source: USEPA 2003b.

Table B-6. Emissions from Construction Equipment Operation

Equipment	Days	Hours/day	Pieces	CO	VOCs	NO _x	SO _x	PM ₁₀ ²	PM _{2.5} ²
Grading and Excavating									
<i>Scraper</i>	100	8	2						
Emissions factor (grams/hr) ¹				382.67	50.43	1219.19	266.98	1.42	46.04
Emissions (grams)				612265.0	80686.1	1950704.6	427161.6	2278.2	73661.6
Emissions (lbs)				1348.60	177.72	4296.71	940.88	5.02	162.25
<i>Bulldozer</i>	100	8	2						
Emissions factor (grams/hr) ¹				114.06	30.02	332.75	79.76	0.57	18.30
Emissions (grams)				182497.3	48025.6	532398.1	127610.9	905.6	29281.9
Emissions (lbs)				401.98	105.78	1172.68	281.08	1.99	64.50
<i>Grader</i>	100	8	1						
Emissions factor (grams/hr) ¹				164.11	46.07	545.61	125.25	0.69	22.34
Emissions (grams)				131291.5	36853.8	436486.7	100196.2	552.8	17874.1
Emissions (lbs)				289.19	81.18	961.42	220.70	1.22	39.37
<i>Roller</i>	50	8	2						
Emissions factor (grams/hr) ¹				101.29	26.66	295.50	76.16	0.50	16.25
Emissions (grams)				81034.2	21324.8	236400.6	60928.0	402.1	13002.0
Emissions (lbs)				178.49	46.97	520.71	134.20	0.89	28.64
<i>Backhoe/loader</i>	30	8	2						
Emissions factor (grams/hr) ¹				277.55	38.35	236.92	38.80	0.64	20.81
Emissions (grams)				133224.96	18406.08	113723.28	18625.20	308.96	9989.68
Emissions (lbs)				293.45	40.54	250.49	41.02	0.68	22.00
Grading and Excavating Emissions			lbs	2511.70	452.19	7202.01	1617.89	9.80	316.76
			tons	1.26	0.23	3.60	0.81	0.00	0.16
Paving³									
<i>Paving Equipment</i>	15	8	1						
Emissions factor (grams/hr) ¹				102.21	26.90	298.18	69.17	0.51	16.40
Emissions (grams)				12265.3	3227.7	35781.4	8299.8	60.9	1968.0
Emissions (lbs)				27.02	7.11	78.81	18.28	0.13	4.33
<i>Asphalt Paver</i>	15	8	1						
Emissions factor (grams/hr) ¹				154.86	16.26	190.37	39.79	0.31	9.96
Emissions (grams)				18583.6	1950.8	22844.5	4774.2	37.0	1195.1
Emissions (lbs)				40.93	4.30	50.32	10.52	0.08	2.63
<i>Dump Truck</i>	15	8	12						
Emissions factor (grams/hr) ¹				316.91	41.76	1009.70	218.65	1.18	38.13
Emissions (grams)				456356.6	60140.0	1453973.3	314850.7	1698.1	54904.3
Emissions (lbs)				1005.19	132.47	3202.58	693.50	3.74	120.93
<i>Roller</i>	15	8	1						
Emissions factor (grams/hr) ¹				101.29	26.66	295.50	76.16	0.50	16.25
Emissions (grams)				12155.1	3198.7	35460.1	9139.2	60.3	1950.3
Emissions (lbs)				26.77	7.05	78.11	20.13	0.13	4.30
Paving Emissions			lbs	1099.91	150.92	3409.82	742.43	4.09	132.20
			tons	0.55	0.08	1.70	0.37	0.00	0.07

Table B-6. Emissions from Construction Equipment Operation (continued)

Equipment	Days	Hours/day	Pieces	CO	VOCs	NO _x	SO _x	PM ₁₀ ²	PM _{2.5} ²
Building & Facility Construction									
<i>Crane</i>	250	8	2						
Emissions factor (grams/hr) ¹				73.85	30.53	393.88	91.58	0.38	12.42
Emissions (grams)				295410.00	122102.80	1575520.00	366308.40	1536.13	49668.27
Emissions (lbs)				650.68	268.95	3470.31	806.85	3.38	109.40
<i>Generators</i>	250	8	2						
Emissions factor (grams/hr) ¹				133.11	20.78	263.98	66.84	0.40	13.08
Emissions (grams)				532453.68	83125.68	1055920.80	267350.16	1617.58	52301.78
Emissions (lbs)				1172.81	183.10	2325.82	588.88	3.56	115.20
<i>Air Compressors</i>	450	8	2						
Emissions factor (grams/hr) ¹				33.70	23.59	232.50	40.10	0.29	9.48
Emissions (grams)				242611.20	169827.84	1674017.28	288707.33	2110.72	68246.53
Emissions (lbs)				534.39	374.07	3687.26	635.92	4.65	150.32
<i>Concrete Truck</i> ⁴	60	8	2						
Emissions factor (grams/hr) ¹				316.91	41.76	1009.70	218.65	1.18	38.13
Emissions (grams)				304237.7	40093.3	969315.6	209900.4	1132.0	36602.9
Emissions (lbs)				670.13	88.31	2135.06	462.34	2.49	80.62
Building & Facility Const.Emissions			lbs	3028.00	914.43	11618.44	2493.98	14.09	455.55
			tons	1.51	0.46	5.81	1.25	0.01	0.23
Utilities Relocation									
<i>Excavator</i>	90	8	2						
Emissions factor (grams/hr) ¹				104.62	27.53	305.20	73.15	0.52	16.79
Emissions (grams)				150649.63	39644.64	439489.15	105341.47	747.58	24171.90
Emissions (lbs)				331.83	87.32	968.04	232.03	1.65	53.24
<i>Backhoe/loader</i>	40	8	2						
Emissions factor (grams/hr) ¹				277.55	38.35	236.92	38.80	0.64	20.81
Emissions (grams)				177633.28	24541.44	151631.04	24833.60	411.95	13319.57
Emissions (lbs)				391.26	54.06	333.99	54.70	0.91	29.34
<i>Bulldozer</i>	40	8	2						
Emissions factor (grams/hr) ¹				114.06	30.02	332.75	79.76	0.57	18.30
Emissions (grams)				72998.9	19210.2	212959.2	51044.4	362.3	11712.8
Emissions (lbs)				160.79	42.31	469.07	112.43	0.80	25.80
<i>Crane</i>	10	6	1						
Emissions factor (grams/hr) ¹				73.85	30.53	393.88	91.58	0.38	12.42
Emissions (grams)				4431.15	1831.54	23632.80	5494.63	23.04	745.02
Emissions (lbs)				9.76	4.03	52.05	12.10	0.05	1.64
Utilities Relocation Emissions			lbs	893.64	187.73	1823.15	411.26	3.40	110.02
			tons	0.45	0.09	0.91	0.21	0.00	0.06
Total Emissions			lbs	7533.26	1705.27	24053.43	5265.56	31.38	1014.53
			tons	3.77	0.85	12.03	2.63	0.02	0.51

¹ Calculated with the following formula: emissions (grams/horsepower-hour) x horsepower x typical load factor
Emission rates and horsepower from USEPA 2006
Assumes Tier 2 equipment (model years 2001 and newer).
Typical load factor from USAF 2002.

² Per USEPA 2004, PM₁₀ from construction equipment exhaust is calculated at 3% of total PM, and PM_{2.5} is calculated at 97% of total PM.

³ Asphalt paving assumes standard 6-inch thickness for 2 miles of 27-ft-wide road with density of 2 tons per cubic yard, 10 mile round trip for 15-ton dump trucks, and four 2-hour round trips each for 12 trucks per day loading, transporting, and unloading.

⁴ For building floors; assumes 0.5-ft floor thickness, 9 cubic yards per truck, 2-hour round trip.

Table B-7. HAPs from Construction Equipment

HAPs emissions = VOCs emissions x 29.83% ¹

VOCs emissions = 1705.27 lbs
HAPs emissions = 508.68 lbs
= 0.25 tons

¹ From USAF 2002.

² From Table B-6.

Table B-8. Emissions from Worker Vehicles

			Vehicle Exhaust Component				
			CO	VOCs	NO _x	SO _x	PM ₁₀
Number of workers ¹	15						
Commute (miles) ²	15						
Days ³	750						
Total Miles	168,750						
	Emissions factor ⁴	grams/mile	10.2	0.6	0.7	0.072	0.011
		lbs/mi	0.02247	0.00132	0.00154	0.00016	0.00002
Total emissions		lbs	3791.30	223.02	260.19	26.76	4.089
		tons	1.90	0.11	0.13	0.01	0.002

¹ Assumed to average 15 per day for the life of the project.

² Assumed to average 15 miles.

³ Number of work-days in the 3-year project, assumed to be 250 work days per year.

⁴ From Tables 4-5, 4-6, 4-7, and 4-50 in USAF 2002 for calendar year 2007;
assumes average vehicle model year of 2003 for low altitude light duty gas vehicles.

Table B-9. Emissions from Off-Site Hot Mix Asphalt Plant

		CO	VOCs	NO _x	SO _x	PM ₁₀
Emission factors (lbs/ton asphalt) ¹		0.4	0.0082	0.025	0.0046	0.027
Tons of HMA		10,800				
Emissions	lbs	4,320	89	270	50	292
Emissions	tons	2.16	0.04	0.14	0.02	0.15

¹ From USEPA 2004, for batch mix plants using a natural gas-fired dryer, hot screens, and mixer.

Table B-10. HAPs Emissions from Off-Site Hot Mix Asphalt Plant

$$\begin{aligned} \text{HAPs emissions} &= \text{VOCs emissions} \times 0.77\% \quad ^1 \\ \text{VOCs emissions} &= 89 \text{ lbs} \quad ^2 \\ \text{HAPs emissions} &= 0.68 \text{ lbs} \\ &= 0.000341 \text{ tons} \end{aligned}$$

¹ Emission factors are from AP-42 Vol I Chapter 11.1 Hot Mix Asphalt Plants, April 2004.

² From Table B-9.

Table B-11. Estimated Emissions from Housing Units

	CO	VOC	NO _x	SO _x	PM ₁₀
Emission factors (lbs/million ft ³) ¹	40.0	5.5	94.0	0.6	7.6
Emission factors (lbs/thousand ft ³)	0.0400	0.0055	0.0940	0.0006	0.0076
Additional factors:	383 housing units				
	36 average annual consumption/unit (thousand ft ³) ²				
Yield:	13788 total annual consumption (thousand ft ³)				
Emissions:					
lbs/year	551.5200	75.8340	1296.0720	8.2728	104.7888
tons/year	0.276	0.038	0.648	0.004	0.0524
tons/day	0.001	0.000	0.002	0.000	0.000

¹ From USEPA 1998.AP-42 Vol I Chapter 1.4 Natural Gas Combustion, July

² From DOE 2001 for western U.S.; all sources (space heating, water heating, appliances).

Table B-12. Estimated HAPs Emissions from Housing Units

	Inorganic HAPs	Organic HAPs	Total
Emission factors (lbs/million ft ³) ¹	0.00606	1.881198	1.887258
Emission factors (lbs/thousand ft ³)	0.00000606	0.001881198	0.00188726
Additional factors:	383 housing units		
	36 average annual consumption/unit (thousand ft ³) ²		
Yield:	13788 total annual consumption (thousand ft ³)		
Emissions:			
lbs/year	0.08356	25.93796	26.02151
tons/year	0.00004	0.01297	0.01301

¹ From USEPA 1998.

² From DOE 2001 for western U.S.; all sources (space heating, water heating, appliances).

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APPENDIX C

SKEET RANGE SOIL SAMPLING RESULTS

**PRELIMINARY SOIL SAMPLING AND ANALYTICAL REPORT
OCTOBER 2003
TRAP AND SKEET RANGE
PETERSON AFB CO**

Prepared by: 21 CES/CEVQ
Peterson AFB CO

18 November 2003

Discussion

The analytical results for the total lead analyses and the TCLP analyses are shown in Table 1. Copies of the actual laboratory results are included in Appendix A.

Table 1: Analytical Results			
<u>Sample ID:</u>	<u>Total Lead (EPA 6010B)</u> <u>(mg/kg)</u>	<u>TCLP</u> <u>(mg/l)</u>	<u>Reporting Limit</u> <u>(mg/kg)</u>
2-01	250		10
2-02	600	6.0	10 (0.20 mg/l TCLP)
2-03	840		10
2-04	130		10
2-05	64		10
2-06	43		10
2-07	170		10
2-08	15000	4.1	10 (0.20 mg/l TCLP)
2-09	25000		10
2-10	120		10
2-11	240		10
2-12	250		10
2-13	18000		10
2-14	60		10
2-15	ND		10
2-16	19		10
2-17	36000		10
2-18	16000		10
2-19	39		10

As shown in Table 1, the analytical results range from not detected (ND at 10 mg/kg) to 36,000 mg/kg total lead. Five samples, 2-08, 2-09, 2-13, 2-17, and 2-18 have total lead concentrations that range from 15,000 mg/kg to 36,000 mg/kg, well above the state regulatory use standard of 2920 mg/kg lead for commercial sites. Two samples, 2-02 and 2-03 have concentrations that exceed the residential use standard (400 mg/kg): 600 mg/kg and 840 mg/kg, respectively. All other samples showed total lead results that were less than the residential use standard. The total lead analytical results that exceed the residential use standard are shown on Figure 1.

One TCLP analytical result was greater than the 5.0 mg/l regulatory criteria for hazardous levels: sample number 2-02. Sample 2-08 also has leachable lead at 4.1 mg/l, less than the regulatory limit. However, in the case of 2-02 the total lead

FINAL

REMEDIAL INVESTIGATION REPORT
TRAP AND SKEET RANGE

PETERSON AIR FORCE BASE
COLORADO SPRINGS, COLORADO

Contract Number: F41624-03-D-8609
Task Order 0259

Data Item:

A001B: Remedial Investigation Report
A001C: Analytical Data Package
A001D: Site Characterization Summary Report
B005: Digital Imaging

Prepared for:

AFCEE
3300 North Road
Brooks City Base, Texas 78235-5112

Prepared by:

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August 2005

**Table 3-1. Sample Collection Summary
Peterson Air Force Base, Colorado Springs, Colorado**

Analytes	Method	Number of Surface Samples	Number of Subsurface Samples
Screening Samples			
Lead	XRF	134	42
Confirmation Samples			
Lead	SW6010B	29	6
TCLP –lead only	Preparation SW1311/ Analysis SW6010B	6	8
PAHs	SW8270-SIM	41	21
Background Samples			
Lead	SW6010B	10	-
PAHs	SW8270-SIM	10	-
Geotechnical Samples			
Moisture Content	ASTM D2937	3	2
Specific Gravity	ASTM D854	3	2
Sieve Analysis	ASTM D422	3	2

Notes:

XRF Screening Limit for lead is 20 mg/kg, below Region 9 PRGs.

Laboratory Reporting Limits are below the PRGs for lead and PAHs.

ASTM -	American Society for Testing and Materials
XRF	- X-ray Fluorescence Spectrometer
TCLP	- Toxicity Characterization Leachate Procedure
PAHs	- Polynuclear Aromatic Hydrocarbons
SIM	- Selective Ion Monitoring

**Table 3-2. Sample Locations Screened by XRF
Peterson Air Force Base, Colorado Springs, Colorado**

Surface XRF (0 - 0.5 ft)				Subsurface XRF (0.5 - 1 ft and 1 - 2 ft)	
A350	H400	L025	P450	B400	Q400
A500	H450	L100	P600	C450	Q500
B550	H500	L300	P700	D550	Q600
C300	H700	L350	Q000	E400	R300
C600	H800	L400	Q025	E500	R500
D200	H900	L550	Q100	F000	
D350	I025	L600	Q200	F550	
D700	I100	L700	Q300	F600	
E100	I200	L800	Q350	G000	
E200	I350	M000	Q450	G200	
E300	I400	M100	Q550	G550	
E600	I450	M200	Q700	H000	
E800	I500	M450	R100	H550	
F025	I550	M500	R200	H600	
F100	I700	M550	R400	I000	
F200	I800	M600	R600	I300	
F300	I900	M700	S200	I600	
F350	J000	N025	S350	J200	
F400	J025	N100	T300	J350	
F450	J100	N200	T450	J500	
F500	J300	N300	U400	K200	
F700	J400	N350		K300	
F800	J450	N550		K350	
F900	J550	N600		L200	
G025	J600	N700		L450	
G100	J700	O000		L500	
G300	J800	O025		M025	
G350	J900	O100		M300	
G400	K000	O200		M350	
G450	K025	O300		M400	
G500	K100	O350		N000	
G600	K400	O550		N400	
G700	K450	O600		N450	
G800	K500	O700		N500	
G900	K550	P000		O400	
H025	K600	P025		O450	
H100	K700	P100		O500	
H200	K800	P200		P400	
H300	K900	P300		P500	
H350	L000	P350		P550	

**Table 4-1 Background Lead Results
Peterson Air Force Base, Colorado Springs, Colorado**

Background Sample	Sample Depth (ft bgs)	Lead Result (mg/kg)
0	0 – 0.5	6.7
1	0 – 0.5	137
2	0 – 0.5	14.2
3	0 – 0.5	17.2
4	0 – 0.5	7.5
5	0 – 0.5	8.4
6	0 – 0.5	11.3
7	0 – 0.5	11.5
8	0 – 0.5	9.2
9	0 – 0.5	11.9

Note:

ft bgs – feet below ground surface
mg/kg – milligrams per kilogram

Statistical Analysis

Mean	10.86
Standard Deviation	3.38
95% T-Statistic	1.86
Coefficient of Variation	0.31
Background	17.15

T-statistic value from CDPHE “Proposed soil remediation objectives policy document”

Table 4-2a. XRF Screening Results for Surface Soils (0-0.5 ft)
Peterson Air Force Base, Colorado Springs, Colorado

Location XRF Result (ppm)	
Northern Area	
A350	160
A500	90
B400	406
B550	66
C300	305
C450	399
C600	121
D200	ND
D350	137
D550	337
D700	40
E100	25
E200	206
E300	75
E400	387
E500	732
E600	363
E800	ND
F-Range	
F000	700
F025	328
F100	84
F200	197
F300	80
F350	48
F400	99
F450	239
F500	634
F550	715
F600	675
F700	196
F800	51
F900	60
G-Range	
G000	614
G025	234
G100	225
G200	301
G300	76
G350	119
G400	126
G450	230
G500	166
G550	777
G600	211
G700	65
G800	54
G900	53

XRF = X-Ray Fluorescence Spectrometer

Location	XRF Result (ppm)
H-Range	
H000	403
H025	178
H100	192
H200	99
H300	88
H350	56
H400	60
H450	53
H500	53
H550	837
H600	483
H700	124
H800	55
H900	59
I-Range	
I000	782
I025	170
I100	285
I200	203
I300	342
I350	154
I400	163
I450	144
I500	127
I550	58
I600	634
I700	210
I800	56
I900	57
J-Range	
J000	69
J025	176
J100	152
J200	337
J300	163
J350	291
J400	141
J450	60
J500	198
J550	56
J600	61
J700	137
J800	59
J900	62

ppm = parts per million

Location	XRF Result (ppm)
K-Range	
K000	77
K025	89
K100	170
K200	930
K300	486
K350	393
K400	144
K450	59
K500	56
K550	119
K600	379
K700	59
K800	57
K900	60
L-Range	
L000	288
L025	288
L100	258
L200	325
L300	183
L350	60
L400	115
L450	385
L500	297
L550	241
L600	93
L700	57
L800	59
M-Range	
M000	57
M025	40
M100	58
M200	130
M300	149
M350	159
M400	274
M450	146
M500	122
M550	55
M600	61
M700	57

ND = non detect

Location	XRF Result (ppm)
N-Range	
N000	56
N025	61
N100	60
N200	74
N300	ND
N350	60
N400	162
N450	498
N500	237
N550	111
N600	122
N700	57
O-Range	
O000	58
O025	55
O100	62
O200	58
O300	94
O350	60
O400	154
O450	240
O500	113
O550	113
O600	65
O700	58
P-Range	
P000	65
P025	71
P100	ND
P200	49
P300	44
P350	114
P400	212
P450	120
P500	320
P550	231
P600	109
P700	39

Location	XRF Result (ppm)
Q-Range	
Q000	72
Q025	63
Q100	80
Q200	59
Q300	59
Q350	95
Q400	147
Q450	121
Q500	162
Q550	120
Q600	137
Q700	48
Southern Area	
R100	43
R200	ND
R300	142
R400	50
R500	67
R600	53
S200	53
S350	ND
T300	51
T450	ND
U400	45

**Table 4-2b. XRF Screening Results for Subsurface Soils (0.5-1 ft)
Peterson Air Force Base, Colorado Springs, Colorado**

Location	XRF Result (ppm)
G200	514
L450	379
J350	305
I300	304
K200	157
J500	113
G550	103
H550	90
H000	85
Q500	61
J200	58
H600	57
D550	54
C450	52
M300	52
N450	47
R300	45
E500	42
E400	ND
F000	ND
F550	ND
F600	ND
G000	ND
I000	ND
I600	ND
K300	ND
K350	ND
L200	ND
L500	ND
M025	ND
M350	ND
M400	ND
N000	ND
N400	ND
N500	ND
O400	ND
O450	ND
O500	ND
P400	ND
P500	ND
P550	ND
Q400	ND
Q600	ND
R500	ND
B400	ND

XRF = X-Ray Fluorescence Spectrometer

ppm = parts per million

ND = non detect

Table 4-3a. Background Results and Background Cleanup Levels for PAHs
Peterson Air Force Base, Colorado Springs, Colorado

Sample Location		2-Methyl-naphthalene (µg/kg)	Adjusted Value		Ace-naph-thene (µg/kg)	Adjusted Value	Natural Logarithm calculation		Ace-naph-thylene (µg/kg)	Adjusted Value		Anth-racene (µg/kg)	Adjusted Value	Natural Logarithm calculation		Benzo [a] anth-racene (µg/kg)	Adjusted Value	Natural Logarithm calculation		Benzo [a] pyrene (µg/kg)	Adjusted Value	Natural Logarithm calculation
PSR-BKG0-051705-SA1	<	0.3	0.2		0.8		-0.2		0.4			1.8		0.6		5.8		1.8		12.9		2.6
PSR-BKG1-051705-SA1		1.4			10.7		2.4		1.2			19.5		3.0		150.1		5.0		275.8		5.6
PSR-BKG2-051705-SA1		1.0			1.6		0.5		1.0			3.4		1.2		14.4		2.7		32.7		3.5
PSR-BKG3-051705-SA1		0.6			0.7		-0.4		0.6			1.6		0.5	<	0.6	0.3	-1.3	<	0.3	0.2	-1.9
PSR-BKG4-051705-SA1		0.4			0.4		-0.9		1.1			1.2		0.2	<	0.6	0.3	-1.2	<	0.3	0.2	-1.6
PSR-BKG5-051705-SA1	<	0.3	0.2	<	.3	0.2	-1.6	<	0.3	0.1	<	0.4	0.2	-1.6	<	0.6	0.3	-1.2	<	0.3	0.2	-1.6
PSR-BKG6-051705-SA1		0.4			0.4		-0.9		0.4			0.7		-0.4	<	0.6	0.3	-1.2	<	0.3	0.2	-1.6
PSR-BKG7-051705-SA1		0.4			0.3		-1.2		0.3			0.7		-0.4	<	0.6	0.3	-1.2	<	0.3	0.2	-1.6
PSR-BKG8-051705-SA1		0.7			1.0		0.0		1.5			3.7		1.3		16.1		2.8		32.1		3.5
PSR-BKG9-051705-SA1		0.6			3.4		1.2		2.4			12.1		2.5		89.4		4.5		146.1		5.0
Mean		0.6			2.0		-0.1		0.9			4.5		0.7		27.7		1.1		50.1		1.2
Standard Deviation		0.4			3.2		1.2		0.7			6.3		1.4		50.9		2.6		91.1		3.1
Coefficient of variation		0.6			1.6		-10.4		0.8			1.4		2.0		1.8		2.5		1.8		2.6
T Statistic ¹		1.833			1.833		1.833		1.833			1.833		1.833		1.833		1.833		1.833		1.833
95 % Confidence Limit (before natural log or before antilog)					7.8		2.1					16.1		3.2		121.1		5.8		217.0		6.9
95 % Confidence Limit		1.3					8.1		2.2					24.6				323.0				974.3

< = Laboratory reported concentration less than data listed, therefore values were adjusted by half

¹ = T Statistic for 10 samples from Proposed Soil Remediation Objectives Policy Document, Colorado Department of Public Health and Environment, 1997

PAHs = Polynuclear Aromatic Hydrocarbons

µg/kg = micrograms per kilogram

Table 4-3a. Background Results and Background Cleanup Levels for PAHs
Peterson Air Force Base, Colorado Springs, Colorado

Sample Location	Benzo [b] fluor- anthene (µg/kg)	Natural Logarithm calculation		Benzo [g,h,i] perylene (µg/kg)	Adjusted Value	Natural Logarithm calculation		Benzo [k] fluor- anthene (µg/Kg)	Natural Logarithm calculation		Chrysene (µg/Kg)	Natural Logarithm calculation		Dibenz [a,h] anth- racene (µg/Kg)	Adjusted Value	Natural Logarithm calculation
PSR-BKG0-051705-SA1	43.6	3.8		13.6		2.6		17.1	2.8		23.0	3.1	<	0.2	0.1	-2.3
PSR-BKG1-051705-SA1	309.7	5.7		162.6		5.1		234.6	5.5		211.2	5.4		91.4		4.5
PSR-BKG2-051705-SA1	55.9	4.0		29.1		3.4		44.6	3.8		43.8	3.8	<	0.2	0.1	-2.3
PSR-BKG3-051705-SA1	26.7	3.3	<	0.4	0.2	-1.6		17.2	2.8		17.0	2.8	<	0.2	0.1	-2.3
PSR-BKG4-051705-SA1	10.7	2.4	<	0.4	0.2	-1.6		9.4	2.2		9.3	2.2	<	0.2	0.1	-2.3
PSR-BKG5-051705-SA1	6.0	1.8	<	0.4	0.2	-1.6		3.8	1.3		4.9	1.6	<	0.2	0.1	-2.3
PSR-BKG6-051705-SA1	12.0	2.5	<	0.4	0.2	-1.6		8.2	2.1		9.0	2.2	<	0.2	0.1	-2.3
PSR-BKG7-051705-SA1	13.9	2.6	<	0.4	0.2	-1.6		6.6	1.9		9.0	2.2	<	0.2	0.1	-2.3
PSR-BKG8-051705-SA1	71.1	4.3		25.7		3.2		48.1	3.9		46.0	3.8	<	0.2	0.1	-2.3
PSR-BKG9-051705-SA1	208.3	5.3		83.5		4.4		166.4	5.1		131.2	4.9	<	0.2	0.1	-2.3
Mean	75.8	3.6		31.6		1.1		55.6	3.1		50.4	3.2		9.2		-1.6
Standard Deviation	101.7	1.3		52.9		2.9		79.5	1.4		67.9	1.2		28.9		2.2
Coefficient of variation	1.3	0.4		1.7		2.7		1.4	0.4		1.3	0.4		3.1		-1.3
T Statistic ¹	1.833	1.833		1.833		1.833		1.833	1.833		1.833	1.833		1.833		1.833
95 % Confidence Limit (before transformation or logged)	262.3	6.0		128.4		6.4		201.4	5.7		174.9	5.5		62.2		2.3
95 % Confidence Limit		387.3				593.8			292.4			239.1				10.3

< = Laboratory reported concentration less than data listed, therefore values were adjusted by half

¹ = T Statistic for 10 samples from Proposed Soil Remediation Objectives Policy Document, Colorado Department of Public Health and Environment, 1997

PAHs = Polynuclear Aromatic Hydrocarbons

µg/kg = micrograms per kilogram

Table 4-3a. Background Results and Background Cleanup Levels for PAHs
Peterson Air Force Base, Colorado Springs, Colorado

Sample Location	Fluor-anthene (µg/kg)	Natural Logarithm calculation		Fluorene (µg/kg)	Adjusted Value	Natural Logarithm calculation		Indeno [1,2,3-cd] pyrene (µg/kg)	Adjusted Value	Natural Logarithm calculation		Naph-thalene (µg/kg)	Adjusted Value		Phen-anthrene (µg/kg)	Natural Logarithm calculation		Pyrene (µg/kg)	Natural Logarithm calculation
PSR-BKG0-051705-SA1	24.6	3.2		0.7		-0.4	<	0.3	0.1	-2.3	<	0.4	0.2		8.4	2.1		24.0	3.2
PSR-BKG1-051705-SA1	273.6	5.6		6.6		1.9		136.9		4.9		2.7			112.7	4.7		246.1	5.5
PSR-BKG2-051705-SA1	58.4	4.1		1.2		0.2	<	0.3	0.1	-2.3		1.1			21.9	3.1		52.1	4.0
PSR-BKG3-051705-SA1	28.7	3.4		1.0		0.0	<	0.3	0.1	-2.3		0.6			11.7	2.5		25.3	3.2
PSR-BKG4-051705-SA1	15.9	2.8		0.6		-0.5	<	0.3	0.1	-2.3		0.8			7.0	1.9		14.3	2.7
PSR-BKG5-051705-SA1	8.2	2.1	<	.37	0.2	-1.6	<	0.3	0.1	-2.3	<	0.4	0.2		2.9	1.1		6.7	1.9
PSR-BKG6-051705-SA1	13.0	2.6	<	.36	0.2	-1.6	<	0.3	0.1	-2.3		0.5			5.0	1.6		12.1	2.5
PSR-BKG7-051705-SA1	13.3	2.6		0.5		-0.7	<	0.3	0.1	-2.3		0.5			5.4	1.7		11.9	2.5
PSR-BKG8-051705-SA1	64.0	4.2		1.4		0.3	<	0.3	0.1	-2.3		1.0			19.3	3.0		57.6	4.1
PSR-BKG9-051705-SA1	261.7	5.6		3.4		1.2		60.3		4.1		1.0			83.8	4.4		211.9	5.4
Mean	76.1	3.6		1.6		-0.1		19.8		-0.9		0.9			27.8	2.6		66.2	3.5
Standard Deviation	102.7	1.2		2.0		1.1		45.3		2.9		0.7			38.2	1.2		87.8	1.2
Coefficient of variation	1.3	0.3		1.3		-9.7		2.3		-3.1		0.8			1.4	0.5		1.3	0.4
T Statistic ¹	1.833	1.833		1.833		1.833		1.833		1.833		1.833			1.833	1.833		1.833	1.833
95 % Confidence Limit (before transformation or logged)	264.4	5.9		5.2		1.9		102.8		4.3		2.2			97.9	4.8		227.2	5.7
95 % Confidence Limit		350.6				6.8				76.4		8.9				123.7			306.0

< = Laboratory reported concentration less than data listed, therefore values were adjusted by half

¹ = T Statistic for 10 samples from Proposed Soil Remediation Objectives Policy Document, Colorado Department of Public Health and Environment, 1997

PAHs = Polynuclear Aromatic Hydrocarbons

µg/kg = micrograms per kilogram

Table 4-3b. Results of PAH Concentrations
Peterson Air Force Base, Colorado Springs, Colorado

Sample Locations	2-Methyl-naphthalene (µg/kg)	Acenaph-thene (µg/kg)	Ace-naph-thylene (µg/kg)	Anthracene (µg/kg)	Benzo [a] anth- racene (µg/kg)	Benzo [a] pyrene (µg/kg)	Benzo [b] fluor-anthene (µg/kg)	Benzo [g,h,i] perylene (µg/kg)	Benzo [k] fluor-anthene (µg/kg)	Chrysene (µg/kg)	Dibenz [a,h] anth- racene (µg/kg)	Fluor-anthene µg/kg)	Fluorene (µg/kg)	Indeno [1,2,3 cd] pyrene (µg/kg)	Naph- thalene (µg/kg)	Phen-anthrene (µg/kg)	Pyrene (µg/kg)
Tier 1 RBSLs ² for PAHs (µg/kg)	--	3,700,000	NTD ¹	18,000,000	610	61	610	NTD ¹	6,100	6,100	61	2,500,000	2,500,000	610	2,400,000	NTD ¹	1,800,000
PSR-E050-051805-SA1	12.3	33	2.94	66.1	5.88	3.15	1063.4	3.68	541.3	1384.9	2.21	593.9	17	2.84	5.8	369.8	1342.9
PSR-E050-051805-SA2	101.5	537.1	5.	1167.	7465.4	13220	11534	4645.1	8027.5	9204.1	2485.8	8105.5	397	3776.8	102.9	5039.4	9910.5
PSR-E050-051805-SA3	57.7	375.8	3.3	926.3	5018.7	9448.3	8772.9	3715.1	7086.3	6218.7	2073.2	6391.3	326.4	3402.6	65.8	3569.6	6453.2
PSR-E125-051805-SA1	21	153.2	2.88	189.3	1479.8	2925.8	2924.3	1229.3	2400.1	1965.8	867.2	1934.6	58.9	996.9	22.8	807.2	1957.4
PSR-F030-051605-SA1	4392.4	29735	593.22	36606	513453	799876	709750	405749	479614	702232	217103	605040	9257.7	278204	4875.1	216298	699051
PSR-F075-051605-SA1	924.7	3333.4	146.14	5775.2	77960	127536	102912	59693	49858	116947	37935	62949	1429.8	23624	583.2	32301	104151
PSR-G030-051605-SA1	1833.7	1197.7	291.67	7257.2	139254	238098	99023	89113	28435	213722	218.75	26897	1281.6	281.25	416.67	36315	166320
PSR-G030-051605-SA2	1832.5	22212	146.9	37310	234557	344746	397031	148719	238338	280491	86889	366051	13341	153906	3215.2	172969	324116
PSR-G030-051605-SA3	343	3011.8	28.99	5854.2	31592	52733	61049	22187	34598	39224	13349	49640	2403.7	21292	478.9	28244	44210
PSR-G075-051605-SA1	956.3	3953.8	143.88	6664.1	83433	124275	101110	53806	54981	120542	37718	75100	1703.8	24191	767.6	36773	113962
PSR-H050-051605-SA1	2049.9	7310.2	149.89	14048	185676	302226	228692	113979	122262	269595	64084	139229	3430.9	66084	1313.8	71378	225160
PSR-H120-051605-SA1	159.1	1387.4	14.7	1963.8	16479	27847	27732	13436	19402	21180	7120.3	23058	592.6	11865	239.7	9542.8	22918
PSR-H120-051705-FD3	13	120.8	2.88	196.9	1640.2	2757.2	3061.8	1269.8	1930.6	2185.8	820.5	2747.	54	984.5	21.9	1055.3	2646.1
PSR-H120-051705-SA2	334.6	3858.8	57.38	5934.7	45702	74342	85970	35064	51599	57966	20692	76744.1	1706.	31993	720.5	29230	70483
PSR-H120-051705-SA3	9.8	132.5	3.24	208.3	1417.3	2380.2	2579.3	1146.4	1852.6	1810.7	820.5	2337.5	56.7	886	19.1	947.4	2145.6
PSR-I030-051605-SA1	19.9	168.1	1.7	223.4	2330.3	4268.4	4388.9	2206.9	2093.	3020.6	987.2	2917.1	59.6	1741	19.7	1195.3	3258.7
PSR-I090-051605-FD3	1.6	5.8	.29	10.1	130.3	251.6	192.3	115.3	96.8	207.4	.22	101.2	2.8	41.1	1	58.4	187.9
PSR-I090-051605-SA1	21.6	215.5	2.9	185.7	1859.4	3734.2	3349.8	2059.3	2859.7	2488.2	1097.3	2340.4	57	1596	21.4	946.4	2507.3
PSR-I090-051605-SA2	23.4	204	2.9	266.	2486.4	4310.9	4632.4	2301.6	2647.8	3242.9	1165.8	3493.2	83.1	1769.2	29.2	1476.6	3517.9
PSR-I090-051605-SA3	2.2	11.5	.29	15.4	198.8	393.4	351.5	197.	251.2	269.7	102.1	209.7	3.9	129.5	2.5	78.3	268.5
PSR-J040-051605-SA1	2027.7	14735	150.38	27307	201027	346237	309464	142568	245635	256794	77657	259693	8803.3	118878	2595.2	125274	272732
PSR-J040-051605-SA4	10.3	45.6	2.98	82.1	880.1	1554.6	1438.2	719.6	639.5	1317.9	604.7	857.7	22.3	206	6.6	422.6	1254
PSR-J040-051705-SA2	1.3	9.4	.29	14.2	124.7	222.6	193.2	175.2	120.3	171.9	85.1	150.7	4.5	95.6	1.4	70.6	172.7
PSR-J040-051705-SA3	8134	243.6	5.88	465.1	5634.2	9868	6660.9	4374.6	3338	7920.6	2284	4292.5	113.5	2062.8	57.3	2383.	7536.1
PSR-J240-051605-SA1	126.5	1372.5	11.4	2250.1	14724	25494	25626	13086	19658	18219	6092.2	23987	767	13629	206.8	10711	21370
PSR-K040-051605-SA1	185.6	1280.5	29.14	2331.8	17941	30143	29830	16446	16765	24221	9222	22120	737.8	10735	233.1	11640	24933
PSR-K190-051605-SA1	95.2	332.2	3.2	705.6	6838	11340	9189.4	4603.6	3508.8	9466	2273	5168.5	210.3	2919.2	54.1	3370.7	8392.6
PSR-L035-051605-SA1	523.8	4857.4	33.7	7753.4	52891	90615	81153	48239	70591	65828	22259	73399	2461.5	42651	805.5	35832	72494
PSR-L105-051605-SA1	34.3	316.2	4.1	625.2	4219.1	7676	7596.7	3844.1	4767.3	5405.4	1855.6	5936.4	188.7	3444.9	45.2	2879.2	5924.2
PSR-M010-051705-SA1	215.5	1412	9.9	2826.1	19153	38605	33416	16907	21494	23557	7995.4	21565	908.5	13373	219.4	12900	26234
PSR-M075-051705-F02	0.4	3.2	.29	5.7	58.9	84.4	17.	70.6	56.5	98.4	53.9	93.5	1.8	28.4	.6	4.7	93.5
PSR-M075-051705-F02	0.33	0.5	.29	.9	.59	.32	111.6	.37	12.1	11.4	.22	11.5	.37	.28	.42	33.8	11.5
PSR-M075-051705-FD1	143.4	847.7	6.5	1421.5	12583	22336	20023	10646	10103	16838	4778.7	13170	426.2	8401.9	150	7140.7	17052
PSR-M075-051705-SA1	158.5	985.5	7.5	1676.7	15857	25073	22223	11491	12654	20091	5219.4	15855.	515.7	9224	180.6	8489.	20113
PSR-M075-051705-SA2	0.5	4.4	.29	7.3	63.1	112.1	144.2	67.5	77.7	102.3	58.4	101.6	2.6	36.2	.9	42.8	99.7
PSR-M075-051705-SA3	0.33	2.4	.29	4.3	24.	39.8	65.	25.5	34.3	44.9	.22	49.7	1.5	.28	.6	22.	45.8

¹ = Health based risk levels for this compound are currently under development (NTD denotes no toxicological data)

² = Tier 1 RBSLs have been converted from milligrams/kilogram to micrograms/kilogram for use in comparing sample results

PAHs = Polynuclear aromatic hydrocarbons

RBSLs = risk based screening levels

Bold items corresponds to results above RBSLs

µg/kg = micrograms per kilogram

Table 4-3b. Results of PAH Concentrations
Peterson Air Force Base, Colorado Springs, Colorado

Sample Locations	2-Methyl-naphthalene (ug/Kg)	Acenaphthene (µg/kg)	Ace-naphthylene (µg/kg)	Anthracene (µg/kg)	Benzo [a] anth- racene (µg/kg)	Benzo [a] pyrene (µg/kg)	Benzo [b] fluor-anthene (µg/kg)	Benzo [g,h,i] perylene (µg/kg)	Benzo [k] fluor-anthene (µg/kg)	Chrysene (µg/kg)	Dibenz [a,h] anth- racene (ug/Kg)	Fluor-anthene (µg/kg)	Fluorene (µg/kg)	Indeno [1,2,3 cd] pyrene (µg/kg)	Naph- thalene (µg/kg)	Phen-anthrene (µg/kg)	Pyrene (µg/kg)
Tier 1 RBSLs ² for PAHs µg/kg)	--	3,700,000	NTD ¹	18,000,000	610	61	610	NTD ¹	6100	6100	61	2,500,000	2,500,000	610	2,400,000	NTD ¹	,1800,000
PSR-N040-051605-SA1	613.1	4961.6	145.99	9611.9	78319.	114872.3	112001.5	64322.2	67923.6	108201.7	41484.6	102572.9	2817.1	44406.3	789.1	50367.9	113644.6
PSR-N040-051705-SA2	2.5	21.3	.3	44.2	340.4	544.8	527.2	261.7	344.2	451.6	143.5	450.7	13.	225.1	3.8	223.5	466.2
PSR-N040-051705-SA3	4.1	45.8	.6	78.	546.6	871.1	863.6	478.9	611.	679.8	229.6	807.6	26.6	451.1	9.5	372.7	745.2
PSR-N150-051605-SA1	68	532.5	8.4	1031.9	6408.8	10049.5	10283.5	4593.2	6508.3	8300.4	2367.6	8849.8	352.1	4458.8	77.9	4888.7	8512.
PSR-N240-051605-SA1	0.8	4.3	.5	8.	57.7	99.3	117.1	50.7	92.	91.6	.22	98.6	2.8	.29	.9	42.6	91.6
PSR-O020-051605-SA1	73.1	843.7	14.55	1727.	10835	16947.2	19962.4	8803.7	12758.4	13587.6	5410.5	17968.5	513.9	8303.4	156.1	8294.1	15441.9
PSR-O045-051605-SA1	223.8	2408.1	25.2	4645.6	30077	46647.4	49369.	22824.1	35865.2	35655.3	12090.2	45759.2	1439.4	24391.1	468.8	21327.	40007.3
PSR-O045-051705-FD3	0.33	0.8	.3	1.7	13.4	21.8	36.9	13.4	21.2	28.8	38.	25.6	.6	.29	.42	8.7	30.1
PSR-O045-051705-SA2	7.6	100	2.95	156.1	1030.6	1707.2	1883.7	962.1	1417.5	1331.9	716.	1629.1	46.4	720.7	15.5	716.6	1455.7
PSR-O045-051705-SA3	0.33	0.9	.3	1.8	4.6	9.2	23.7	.37	13.3	19.2	.22	16.4	.8	.29	.43	8.4	18.8
PSR-P024-051605-SA1	55.6	508.6	5.7	1096.4	6020.3	10959.7	11668.2	4939.2	9699.2	7328.6	2846.4	10005.6	370.7	4981.4	98.9	4895.1	8432.6
PSR-P045-051605-SA1	99.8	1182.3	13.1	2212.8	13182	23730.6	30417.7	10242.2	16001.2	15281.7	5047.3	21667.8	692.9	11081.4	181.2	10440.2	18834.2
PSR-Q030-051605-SA1	42.2	488	4.6	977.6	6383.9	10680.1	11898.1	5956.3	7959.8	7677.2	2713.5	10104.8	319.5	5908.7	65.7	4589.3	8646.1
PSR-Q075-051605-SA1	37.8	510.9	4.1	922.2	6334.3	10330.3	11323.6	5384.2	7936.5	7811.	2559.2	10366.8	282.8	5574.5	73.4	4454.5	8980.7
PSR-R125-051605-SA1	3.5	56.4	1.1	129.9	593.5	974.1	1140.4	479.9	699.6	708.5	241.1	999.5	46.6	500.	5.8	530.1	838.1
PSR-R175-051605-SA1	4.3	38.4	1.	73.8	389.	852.9	858.4	467.1	618.6	519.4	202.1	676.5	27.3	355.6	7.3	347.7	608.7
PSR-N045-051705-EB2	0.011	0.006	.008	.02	.018	.015	.03	.017	.01	.021	.014	.05	.02	.016	.011	.04	.05
PSR-O045-051705-EB1	0.01	0.03	.02	.03	.018	.015	.04	.017	.02	.021	.014	.06	.05	.015	.01	.07	.06

¹ = Health based risk levels for this compound are currently under development (NTD denotes no toxicological data)

² = Tier 1 RBSLs have been converted from milligrams/kilogram to micrograms/kilogram for use in comparing sample results

PAHs = Polynuclear aromatic hydrocarbons

RBSLs = risk based screening levels

Bold items corresponds to results above RBSLs

µg/kg = micrograms per kilogram

Summary of Skeet Range Soil Sample Results for Lead ^{1,2}

Sample ID	Concentration (mg/kg)
<i>Samples from depth 0 to 0.5 ft</i>	
PSR-H550-051805-SA1	61.11
PSR-N300-051105-SA1	135.32
PSR-E500-051605-SA1	943.4
PSR-K200-051205-SA1 ³	45726.36
	46324.95
PSR-I000-051305-SA1	1170.39
PSR-M350-051605-SA1	261.14
PSR-M350-051605-FD1 ⁴	205.16
PSR-N000-051805-SA1	89.57
PSR-N000-051805-FD1 ⁴	102.91
PSR-O550-051105-SA1	143.72
PSR-J100-051205-SA1	206.29
PSR-Q000-051105-SA1	51.72
PSR-G600-051305-SA1	330.99
PSR-C300-051605-SA1	392.74
PSR-A350-051605-SA1	172.01
PSR-M550-051605-SA1	68.99
PSR-Q500-051105-SA1	251.76
PSR-G000-051305-SA1	844.78
PSR-L450-051205-SA1	470.29
PSR-K700-051205-SA1	102.84
PSR-R200-051105-SA1	49.54
<i>Samples from depth 0.5 to 1 ft</i>	
PSR-L450-051905-SA2	526.9
PSR-L450-051905-FD2 ⁴	700.5
PSR-H000-051805-SA2	62.93
PSR-Q600-051805-SA2	11.21
PSR-J500-051805-SA2	343.98
PSR-N000-051805-SA2	4.51
PSR-K200-051905-SA2	630.3
PSR-I300-051805-SA2	537.61
<i>Samples from depth 1 to 2 ft</i>	
PSR-I300-051805-SA3	13.21
PSR-G200-051805-SA3	270.2
PSR-G200-051805-FD3 ⁴	291.5
<i>Samples from depth 3 to 4 ft</i>	
PSR-F100-052305-SA5	453.79
PSR-N100-052305-SA5	3.09

¹ Data summarized by Labat Environmental, Inc. for use in *Environmental Assessment for Military Housing Privatization Initiative* from URS Group, Inc.'s 2005 *Final Remedial Investigation Report, Trap and Skeet Range*, Appendix C and attached O'Brien and Gere Laboratories, Inc. analytical data packages.

² Analyzed by Method SW6010B, Test Methods for Evaluating Solid Wastes, SW-846, 3rd ed., Final Update III, December 1996 (including AFCEE 3.1 + variances).

³ Results reported for two dilutions of single sample.

⁴ Field duplicate.